

The background of the top half of the page is a detailed architectural floor plan of a building. It shows various rooms, corridors, and structural elements. Some rooms are labeled with text such as 'OFFICE', 'RECEPTION', 'CONFERENCE', and 'STORAGE'. The lines of the floor plan are white and light blue against a dark blue background. A large white title is superimposed over the upper portion of the plan.

# Getting It Right The First Time

A PLAN TO REVERSE DECLINING  
STANDARDS IN PROJECT DESIGN  
DOCUMENTATION WITHIN THE BUILDING  
AND CONSTRUCTION INDUSTRY

An examination of an industry problem as it applies to Queensland and recommendations for solutions and actions.

This report was prepared by an industry-wide Task Force.

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## Common terms used in this report:

<b>The industry:</b>	The building and construction industry, from construction lawyers to architects, engineers and quantity surveyors, from project owners to contractors, builders and suppliers and subcontractors.
<b>Client:</b>	The Project Owner, e.g. the initiator or promoter of a private development; a government owned corporation (GOC); the Principal under AS 2124 or AS 4000; or the head consultant or head contractor in the supply chain.
<b>Consultant:</b>	The provider of professional services, from architecture, engineering, quantity surveying, project management, to steel detailing and drafting services.
<b>Constructor:</b>	Used interchangeably with builder, contractor or GOC construction arm.
<b>Documentation</b>	Project design documentation refers to documentation that describes a concept or project upon which agreements and/or contracts to supply services are based, excluding generally the design itself.
<b>Industry body:</b>	All stakeholders in the building and construction industry, from GOC's, private sector clients and developers, to professional organisations.
<b>Party:</b>	A party to a building or construction contract or project.

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## Copies of this report are obtainable from:

- Engineers Australia.  
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**ENGINEERS AUSTRALIA**  
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 on the quality of documentation,  
 in association with 17 other  
 industry bodies as listed below.

GETTING IT RIGHT THE FIRST TIME

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October 2005

## Let's Get It Right

Dear Colleague

The quality of project design documentation in the building, engineering and construction industry has declined significantly over the past 15 to 20 years.

This presents a huge challenge to the industry – many participants are unaware of the full extent of:

- the negative impact of current practices
- the enormous cost penalties on the industry
- the angst generated by the existing adversarial culture

In 2004, the Queensland Division of Engineers Australia set up a Task Force to take up this challenge. The Task Force now includes 17 other major industry organisations – all with a will to improve the situation.

This final report is the first major output of the Task Force – the result of two years of intensive research and collaboration within the industry. It carefully analyses the problem and proposes a plan of action to drive change in a tangible and sustainable way.

“Getting It Right The First Time” incorporates feedback from the industry in Queensland on a draft report issued in May 2005. It can be adopted across the broad spectrum of industry participants. It will be a catalyst for improved standards, and the basis for a robust and sustainable industry in the future.

We encourage you to play a part in creating change for the better in our industry – personally and through your own industry body. Spread the message about this report Australia wide through your national counterparts.

The future of our industry is in your hands – be involved, have your say, be an advocate for what we believe is an essential change to our workplace, our industry and the nation's built environment.

**Melissa Griffith**  
*Queensland President 2005*  
*Engineers Australia*

**Peter Jorss**  
*Queensland President 2004*  
*Chairman of Task Force*  
*Engineers Australia*

**On behalf of and with the support of the industry-wide Task Force, which includes representatives of the following industry bodies:**

**Peak construction industry bodies, especially:**

Queensland Major Contractors Association |  
 Civil Contractors Federation | Master Builders  
 Association Queensland | Queensland  
 Property Council of Australia | Australian  
 Institute of Building

**Representatives of the Queensland chapters of the following industry bodies:**

Australian Steel Institute, and Queensland  
 Institute of Steel Detailers | Air Conditioning  
 and Mechanical Contractors Association |  
 Institute of Public Works Engineers Australia |  
 Association of Consulting Engineers Australia  
 | Royal Australian Institute of Architects |  
 Australian Institute of Quantity Surveyors |  
 Building Designers Association | Australian  
 Institute of Project Management | Queensland  
 Law Society (Construction Committee)

**Queensland and Local Government construction authorities, in particular:**

Department of Main Roads | Project Services  
 Division of the Department of Public Works |  
 Brisbane City Council



# Section 1: Executive Summary

## Purpose of the report

The purpose of this report is to present to the engineering and construction industry in Queensland a plan of action for overcoming the problem of the declining quality of project design documentation.

The declining standard of documentation is a problem for the engineering and construction industry nationwide, even worldwide. This report has focused on the problem in Queensland. However, the results will be applicable nationwide with the support of the various stakeholders' national organisations.

The problem is well documented and has been brought about by a range of complex and often related causes. It has led to significant financial losses to consultants, contractors, clients, the State and its taxpayers; an overall loss of quality in the end product; and an increase in disputes and variations. This, in turn, has fuelled an adversarial environment.

Left unaddressed, this situation will continue to erode the foundations of the industry, lessening opportunity, dampening innovation, damaging reputations and deterring new recruits.

Since 2004, an industry-wide Task Force has been working on the problem and its solutions – the recommended solutions are outlined in Section 5 of this report.

A draft of this report was circulated widely in May 2005, and feedback from all parties has been strongly supportive.

Taking account of feedback received on the draft, this final report can be used by the industry as a plan to reverse the problem and as a tool to achieve best practice project design documentation.

## Aims of the Task Force

The aims of the Task Force were to:

- ~ Recruit whole of industry support
- ~ Understand the wider impacts of poor quality of documentation on the industry and on the State economy
- ~ Identify the full range of critical issues and their primary causes
- ~ Develop practical and sustainable recommendations that address the critical issues
- ~ Influence all parties along the supply chain to avoid the pitfalls and adopt best practice in project design documentation.

## The problem

It is well known within the building and construction industry that the quality of project design documentation has declined significantly over the past 15 to 20 years.

The “No Disputes” report by a joint working party of the National Public Works Conference (NPWC) and the National Building and Construction Council (NBCC) in May 1990 identified many aspects of the problem and recommended solutions.

Professional scales of minimum recommended fees such as the Association of Consulting Engineers Australia's (ACEA) fee scale were discontinued in the 1980's, under pressure from the competition authorities, and since then consultants have had to bid for engineering design work. More often than not, the work has been awarded on price rather than value and capability.

Extensive research backed by the wide industry experience of members of the Task Force shows that:

- The declining standard of project design documentation has a positive correlation with a 24% decrease in design fees over the past 12 to 15 years
- 60 to 90% of all variations are due to poor project design documentation
- Standards continue to decline (a common perception – backed up by CSIRO research)
- The industry strongly supports finding a solution to the problem
- Poor documentation has led to:
  - an inefficient, non-competitive industry
  - cost overruns, rework, extensions of time
  - high stress levels, loss of morale, reduced personal output
  - adversarial behaviour, diminished reputations

Anecdotal evidence indicates that this year (2005) Queensland is influencing the method of selection of consultants; there is also recognition of many and valid forms of contract – Main Roads, for example, is trialling “Early Contractor Involvement”; but there remains an overriding need for improved quality of documentation.

*The cost of leaving things as they are:*

- Poor documentation is contributing an additional 10-15% or more to project costs in Australia
- The annual cost to the Queensland construction budget is a financial loss of \$2 billion every year! This equates to a loss Australia wide of at least \$12 billion.

**Ten root causes behind the problem**

The Task Force identified a plethora of industry issues underlying the problem. An analysis of the issues resulted in the identification of 10 root causes:

1. Inadequate project briefs based on unrealistic expectations of time and cost
2. Lack of integration along the supply chain linking the parties, and between project phases
3. Devaluing of professional ethics and standards of business practice
4. Lowest bid selection strategy rather than value for money
5. Poor understanding and skilling in risk assessment and management processes
6. Absence of an experienced client-appointed, overall Design Manager / Coordinator
7. Poor understanding of optimised and properly documented designs
8. Inadequate availability of, and recruitment of, skilled and experienced people
9. Inadequate/ineffective use of technology in design and documentation (e.g. poor application of CAD techniques; technical specifications drawn from an organisation's database but not tailored to the particular project)
10. Lack of appreciation of the benefits of open communication

**Recommendations**

To address these causes and the conflicting and overlapping issues the industry faces, the Task Force has grouped its recommendations into four categories:

**1. Project briefs – including**

- Risk assessment and allocation
- Communication practices

**2. Bidding philosophy and a selection strategy for consulting services****3. Project delivery – including:**

- Professional ethics, standards and accountability in business practices
- Risk management
- A client-appointed overall design manager
- Design process – what is required to optimise designs and provide quality documentation
- Adequate human resources
- Adequate and effective use of technology, e.g. CAD
- Effective communication practices

**4. Implementation strategy – including:**

- Vision for the construction industry
- Building stakeholder support and participation
- Managing the task
- Communicating and marketing the message
- Changing the industry culture and modifying behaviour
- Continuous improvement
- Everyone to play a part

<b>Remedial activities that apply to most of the 10 root causes are:</b>
1. Making sure that the whole of the industry and all of its players are fully aware of the current situation, the consequent waste of resources, and an increasing difficulty with the “do nothing approach”.
2. Promoting the need for a change in culture, across the industry.
3. Reinforcing existing codes of practice, guidelines for industry, and legislation and regulation (modifying where necessary and in some cases assembling new).
4. Strengthening the requirements of continuing professional development, tertiary training and in-service/on the job training.
5. Reinstating equitable remuneration for professional design services within a value for money equation.
6. Improving project delivery across the board.

## Actions

### 1. An industry-wide effort required

This report sets out the issues, the root causes and the draft recommendations in a no-blame non-adversarial manner. For resolution of the problem, however, every sector of the industry needs to play a part:

<b>Industry Participants</b>	<b>Part to Play</b>
<b>Project Owners</b>	<ul style="list-style-type: none"> <li>• provision of project briefs</li> <li>• consultant capability and value ahead of lowest fees</li> <li>• effective risk management</li> </ul>
<b>Professional Consultants</b>	<ul style="list-style-type: none"> <li>• competent deliverables ahead of the lowest fee</li> <li>• professional ethics</li> <li>• recruitment and on-the-job training</li> </ul>

<b>Constructors and Suppliers</b>	<ul style="list-style-type: none"> <li>• competent performance ahead of the low bid</li> <li>• cooperation ahead of adversarial behaviour</li> <li>• recruitment and on-the-job training</li> </ul>
<b>Financiers and Lawyers</b>	<ul style="list-style-type: none"> <li>• a fair contract between equals rather than a tight and outdated master servant contract</li> <li>• cooperative approaches rather than adversarial</li> </ul>

### 2. A win-win outcome for all

The Task Force strongly recommends that all parts of the industry emphasise value for money within a culture of cooperation and excellence, rather than focus on the lowest competitive bid within an adversarial climate.

### 3. Rebuilding our industry – support this effort

The support the Task Force has received means there is widespread interest in and demand for change that will build this win-win outcome.

As we have outlined here, there are immediate steps individuals and organisations can take and there are further steps that will take planning and action.

We urge every industry participant to:

- start the process of change today;
- change your approach to project design documentation; and
- become involved in the efforts of your industry association to make the industry-wide and larger changes required to make this better, safer, value for money approach the norm in our industry.

Please take time to read this report and make a start on the measures that will build a better outcome for all.

# Section 2: The Problem

## Falling standards of project design documentation

A common perception in the building and construction industry is that the quality of project design documentation has declined significantly over the past 15 to 20 years. The “No Disputes” report by a joint working party of the National Public Works Conference (NPWC) and the National Building and Construction Council (NBCC) in May 1990, for example, identified a number of aspects of the problem and recommended solutions.

Professional fee scales such as the Australian Consulting Engineers Australia’s (ACEA) scale of minimum recommended fees were discontinued in the 1980’s under pressure from the competition authorities. Consultants have had to bid for engineering and architectural design work and, more often than not, the work has been awarded on price rather than value and capability.

L Wilson (*Construct in Steel*, Vol 34, No 4 December 2000) discusses views recently expressed by Janet Holmes à Court (Chairman of John Holland Construction):

*“I see the poor quality or late delivery of design documentation on every single one of our projects, with architects encouraged (by clients) to allow builders to start building before all the drawings are quite ready. It starts from day one and everyone gets into strife. On every project where we have difficulties, I can guarantee that design documentation is the main source of the problem.”*

On the other hand tendering on sketch plans of partially completed documentation for major projects is routinely adopted by many client organisations to transfer design risk to the managing contractor. Nevertheless, the problem is particularly evident in the building and infrastructure sectors – more so than in the resources sector. Perhaps this is because the owners of resources projects are more concerned with the “whole of life” performance of their projects, for example, ease of maintenance, and reliability throughout the life of the project, the project output, the commonality of spares, and operational safety.

DOCUMENTATION QUALITY	↑ BETTER	Mining and resource sector clients	<i>Concern with the “whole of life” performance of their projects</i>
	↕	Government and commercial clients	<i>Concern with project quality but less committed to O&amp;M costs</i>
	↓ WORSE	Private one-off clients and developers	<i>Perceived emphasis on project cost, cost of finance and completion date</i>

In the mining sector:

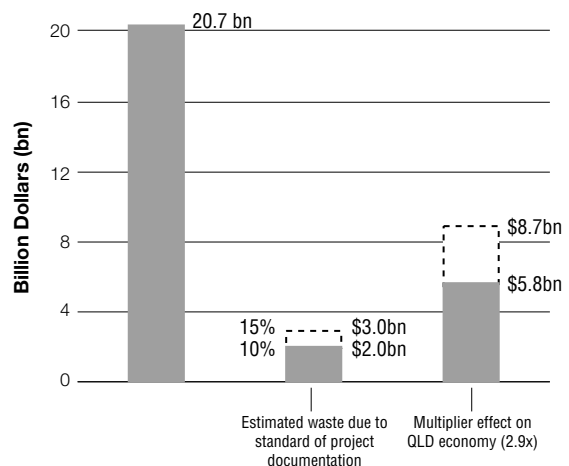
- Client decisions are made by professional engineers
- There is a higher level of repeat business for consultants
- Design fees are less critical than delivery on time

## The evidence

Extensive research into the quality of project design documentation backed by the broad industry experience of the Task Force members shows that:

- A CSIRO industry survey found that 68% of designers and 88% of contractors felt that documentation quality had declined over the past 12 to 15 years and that real design fee incomes had declined approximately 24%. (\*refer Note 1)
- Design efficiency has a nonlinear inverse relationship with project design fees. (\*refer Note 1)
- Project costs due to design inefficiency increase sharply when design fees are reduced below the cost of doing work properly. (\*refer Note 1)
- The concept of reducing total project costs by increasing expenditure on the design process has been well-documented through principles of value engineering and value management. (\*refer Note 1)
- 60 to 90% of all variations are due to poor project design documentation. (\*refer Note 2)
- One price variation results from every three Requests for Information (RFI’s). (\*refer Note 2)
- Poor documentation contributes, on average but conservatively, an additional 10-15%\* to project costs. (\*refer Notes 3 and 4)

**Total Queensland Construction Budget 2005**





- Substandard project documentation therefore equates to an annual financial loss exceeding \$2 billion in the Queensland construction budget – every year!  
(\*refer to Notes 3 and 4)
- 
- Standards continue to decline (This is a common perception – backed up by CSIRO research. Refer note 5 for example):
    - poor documentation leads to serious underperformance within the industry, and:
    - a significant waste of resources – money, materials, time and labour
    - an inefficient, non-competitive industry
    - cost overruns, rework and extensions of time
    - high stress levels, loss of morale and reduced personal output
    - adversarial behaviour and a lowering of professional reputations
    - a potential decline in safety standards  
(\*refer to Note 6)
    - a decline in the viability and sustainability of the industry

Proper project design documentation should be:

- fit for purpose
- unambiguous and coherent
- timely, accurate and complete
- easily communicated and constructed, with the best possible economy and safety
- aligned with the owner's requirements as set out in a project brief

## Notes

[\*Note 1: PA Tilley, SL McFallan and SN Tucker, "Design and documentation quality and its impact on the contract process", CSIRO, IEAust Dec 2000, in a survey of 5500 design consultancy firms and contracting firms, with an overall response rate of 5.4%]

[\*Note 2: Private communication from Eric Levett, Project Services]

[\*Note 3: For example, an analysis of a sample of 50 projects at a leading Queensland Government building authority showed that 88% of variations were due to design and/or documentation problems rather than client requested changes.]

Source of Costs	Percentage of Total
Cost of variations	= 88%** of total variation cost of 14% of total contract value (projects totalling \$200m) = 12% of total contract value, <i>plus</i>
Cost of administration	= 0.9% of total contract of variations value, <i>plus</i>
Cost of extensions of time	= 2.1% of total contract time (est.) value <i>plus</i>
Cost of administration	= 0.2% of total contract value of EoT's
<b>Total cost (upper estimate)</b>	= 15.2% of total contract value
<i>** at a conservative 60%, in lieu of 88%;</i>	
<b>Total cost (lower estimate)</b>	= 12.0% of total contract value

[\*Note 4: Australia's Cooperative Research Centre For Construction Innovation (established in 2001 and headquartered at the Queensland University of Technology) quotes:

*"In 1996-7, the construction cluster comprising supply network, property sector and project-based firms contributed 14.4% to Australia's GDP through 230,000 firms employing 730,000 people.*

*The Australian Bureau of Statistics estimates that from an initial \$1 million extra output and construction, a possible \$2.9 million in output would be generated in the economy as a whole.*

*Poor quality design and documentation is estimated to cost 7% of total construction costs with rework in construction likely to be greater than 10% of project cost. A 10% improvement in efficiency in the construction industry could boost GDP by 2.5% over five years."*]

[Note 5: PA Tilley, "Design and Documentation Deficiency and its Impact on Steel Construction", Steel Construction, Vol 32, No 1, March 1998.]

[\*Note 6: John Carpenter, Secretary of SCOSS, claims:

*"There is considerable evidence of declining standards in the communication of structural information to the contractors. Not only does this lead to cost overruns and dispute, it also raises the spectre of safety being compromised".*  
(*The Structural Engineer*; 3 August 2004).]

## Critical issues

The first step taken in tackling the problem was to list the critical issues currently faced by the industry. The list of issues is based on research and the extensive industry experience of the members of the Task Force. These have been categorised under generic “no blame” headings:

### 1. Issues relating to the current industry environment:

#### *Culture*

- Adversarial attitudes embedded in the industry
- Lack of interaction between client, designer, contractor and supplier
- Lack of understanding of the impact of decisions by upper management, e.g. antipathy towards relationship contracting for design and/or construction services

#### *People, skills and training*

- Erosion of expertise including inadequate training and mentoring
- Lack of funds for on-the-job training and retention of staff between projects

#### *Competition*

- Reluctance to allocate experienced staff to projects because of their high cost in an environment of low-bid fees which are insufficient for the services required
- Competition and purchasing policies inappropriate to complex design and/or construction projects, e.g. effects of state purchasing policies and/or their implementation
- Competition legislation focusing on price rather than on Qualification Based Selection
- Focus by client on low price driving price behaviour by consultants and contractors

#### *Risk allocation*

- Unsupportable risk allocation philosophy
- Adversarial approach to variation of costs or time

### 2. Issues relating to project initiation

- Incomplete project brief and changes to the brief
- Insufficient project business case (net present values, whole-of-life analysis, assessment of benefits)
- Unresearched / inaccurate time and cost expectations
- Fewer greenfield projects and a lack of understanding of the extra risk on brownfield, or retrofit projects leading to tighter tolerances, more interfaces and increased costs without corresponding recompense in fees
- Lack of client understanding of impact of their decisions

### 3. Issues relating to project development

- Inappropriate dependence on price competition at the design stage
- Unrealistic expectations about time and cost restraints on achievement of overall project outcomes
- Lack of leadership in monitoring project outcomes
- Lack of overall project coordination, e.g. between design disciplines
- Reluctance to formally commit to a design at the appropriate stages of the project
- Unrealistic project development design times
- Insufficient and/or late review of design and checking of project design documentation
- Insufficient review with relevant parties
- Incomplete and/or erroneous design and project design documentation, in particular, lack of accuracy, clarity and timeliness – leaving design issues to be sorted out in the construction process
- Inadequate application of design experience and knowledge to CAD design techniques
- Lack of appreciation of tighter tolerances and extra interfaces on brownfield sites
- Inadequate and/or competitive fees limiting proper allocation of experienced staff time and limiting capacity to hold staff between projects

#### *Project planning*

- Lack of appreciation of erection or installation sequence and erection loads

**Design**

- Tendering firm prices on immature designs. Optimum design solution not adequately researched
- Excessive number of “Notices to Tenderers” and question/answer steps eroding document accuracy due to the short time for amendments
- Lack of attention to and unrealistic tolerances

**Constructability**

- Inadequate involvement of construction expertise and consideration of constructability issues, erection sequence and erection loadings, and practical project programming
- Poor coordination between services
- Sub-optimal sequences of project activities

**Cost estimates**

- Inaccurate and/or unrealistic cost estimates

**Scheduling (programming)**

- Inaccurate and/or unrealistic time estimates

**Documentation**

- Design documentation issued with known deficiencies
- Confusing, conflicting and/or voluminous documentation
- “Cut and paste” technique leaving excessive, ambiguous and/or irrelevant information in the document due to lack of integration and the quest for economy of design time
- Erosion of expertise

**4. Issues relating to project delivery****Methodology**

- Optimum design solution not adequately researched
- Inappropriate downward re-negotiation of tendered prices pre-award – both head contract and sub-contract
- Unrealistic tender periods and multiple extensions of closing date
- Unrealistic and/or unclear insurance requirements

**Adversarial as against non-adversarial format**

- Defensive approach to variations and claims for additional costs or time
- Adversarial attitudes embedded in the building and construction industry in general and in company cultures specifically

**Detailed issues**

- Excessive “Notices to Tenderers” and extensions of tender closing date, and the absence of a documentation freeze period prior to tenders closing to allow an adequate review period
- Failure to carry out and/or take responsibility for subsurface investigation
- Failure to provide adequate set-out data
- Outdated material and/or plant specifications
- Excessive number of Requests for Information and inefficient management of the RFI process

**5. Issues relating to project life**

- Inadequate consideration of “whole-of-life” issues
- Fitness for purpose
- Ease of operation and maintenance
- “Gold-plating” of industry documentation and/or inappropriate standards for the required life of project

# Section 3: A “Whole Of Industry” Approach

In December 2002, a paper entitled “Project Documentation Quality and its impact on the Building and Construction Industry” was presented to Engineers Australia in Brisbane by Gallo, Lucas, McLennan, Parminter and Tilley.

Early in 2004 the Queensland Division of Engineers Australia set up a Task Force to investigate the problem of falling standards of contract documentation as discussed in Section 2.

This report has been prepared by this task force, sponsored by the Queensland Division of Engineers Australia and fully supported by representatives of the Queensland chapters of the following industry bodies:

Peak construction industry bodies, especially:

Queensland Major Contractors Association

Civil Contractors Federation

Master Builders Association Queensland

Property Council of Australia

Australian Institute of Building

Australian Steel Institute, and Queensland Institute of Steel Detailers

Air Conditioning and Mechanical Contractors Association

Institute of Public Works Engineers Australia

Peak industry consultant bodies, including:

Association of Consulting Engineers Australia

Royal Australian Institute of Architects

Australian Institute of Quantity Surveyors

Building Designers Association

Australian Institute of Project Management

Queensland Law Society (Construction Committee)

Queensland and Local Government construction authorities, in particular, both as clients and constructors:

Department of Main Roads

Project Services Division of the Department of Public Works

Brisbane City Council

Letters of support for the Task Force's effort have been received from the heads of most of the above bodies. This “whole of industry approach” adds weight to the recommendations in this report.

All members of the Task Force are volunteers drawn from all of the industry bodies listed above who have devoted a significant amount of energy and enthusiasm to this

project. Collectively, there are some 900 years of industry knowledge, experience and capability among the Task Force members.

The Task Force's aims were to:

- Understand the wider impacts of poor quality of project documentation on the building and construction industry and on the Queensland economy, and on the well-being and profitability of all industry players along the supply chain.
- Articulate the problem in a way that allows identification of the full range of critical issues and their primary causes.
- Develop recommendations that address the critical issues, and that can be given practical effect in a tangible and sustainable way.
- Influence the industry at all points along the supply chain to avoid the pitfalls of and to consistently adopt best practice in project documentation quality.

## Scope of the Task Force's investigation and report

The declining standard of project documentation is a problem for the building and construction industry nationwide, even worldwide. This report focuses on the problem in Queensland – a more manageable exercise eliminating the need for a significant budget, extensive travel and a secretariat.

We anticipate the results will be applicable nationwide with the support of various stakeholders' parent organisations.

## Previous research

The primary aim has been to identify and implement solutions that overcome the industry problem of the poor quality of project design documentation. No original research was undertaken – instead the approach has been to review the numerous existing research papers and the outputs of past and present industry reform initiatives such as:

- “No Disputes” put together jointly by the National Public Works Conference (NPWC) and the National Building and Construction Council (NBCC) in May 1990.
- The Construction Industry Development Association (CIDA) funded by the Federal Government in the early 1990's.
- The CSIRO's federally sponsored Cooperative Research Centre (CRC)'s “Construction Innovation” program in the early 2000's.

- Work by the Australian Procurement and Construction Council, in conjunction with the Australian Construction Industry Forum (APCC+ACIF) in 2001-2002.

The Task Force members formally acknowledge the valuable work done previously by the industry. It would not have been possible to complete this task without standing on the shoulders of those who have researched and written about various aspects of the problem in the past.

The Task Force research focused on ensuring that the project outcomes were based on the best available information. The task was to bring all the known information into one place so it could be centrally reviewed and categorised for relevance and usefulness. Tools were then developed to make the information easily available to respective subgroups working on specific elements of the task.

Industry researchers were consulted in the identification of relevant research material. A Register of Research Material was developed, including more than 160 reviewed papers and over 60 books.

In addition to the research, each of the individual task force members has relevant experience in the compilation and/or use of project documentation and has made this experience available to the project – some 900 years of accumulated industry experience in total.

## Methodology – an industry-wide line of attack

This report summarises the outputs from a logical series of activities:

- i) definition of the problem
- ii) listing of the issues
- iii) a review of existing research
- iv) derivation of a list of root causes, each selected as a practicable intervention level from a hierarchy of related issues by:
  - analysing the causes and sorting them into “themes” or families of related causes
  - arranging each family of causes into a hierarchy, i.e. from broad, general causes down to narrow, specific cause
  - nominating the cause (or “intervention level”) within each hierarchy that has the maximum sustainable impact on the problem

- v) matching of solutions developed by the group together with solutions extracted from the literature, to each root cause
- vi) planning for the sustainable implementation of the report’s draft recommendations
- vii) compilation of the draft report
- viii) review of the draft report by interested parties across the industry and incorporation of feedback by the task force into a final report
- ix) production and publication of a final report incorporating generally accepted recommendations
- x) promotion and monitoring of implementation of the report findings in Queensland with, where necessary, legislative support
- xi) adoption nationwide

An interactive construction forum in Brisbane in May 2004 gave universal support to the definition of the problem and the issues set out in this report.

A second interactive forum in June 2005 gave positive feedback to the report’s recommendations - as did individual feedback forms from industry participants. A total of 300 participants experienced in all sectors of the industry participated in the feedback process.

Good work in the past by various interested parties largely failed to make a difference to the industry. Much of this good work lacked whole of industry involvement which lacked industry ownership and support. Many efforts were government initiatives whose funding and support eventually withered.

To ensure this report does make a difference, its emphasis is on the support and involvement of the whole of the building and construction industry. This effort will continue to be on voluntary basis under an efficient budget funded by industry (hence not subject to the vagaries of government funding). Nevertheless, a government subsidy would be welcome to see this project through to a successful outcome.

## Section 4: Analysing the Ten Core Issues

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To find solutions the task force considered it essential to work from the causes that either in isolation or in combination, produce this multi-dimensional problem.

The starting point was to put all causes into groups with a common theme – a process that produced 10 distinct families. Within each family of causes some are more difficult to address – some are less difficult. Each of the groups was sorted into a hierarchy under which the top cause is the most difficult to deal with – the bottom cause is the least difficult to deal with.

### Root causes and intervention levels

Analysis of the causes identified a number of root causes that promote and sustain the growth of the problem. These are shown on the charts in this section as the **intervention level**, this being the highest level at which the task force felt a practical response could be initiated.

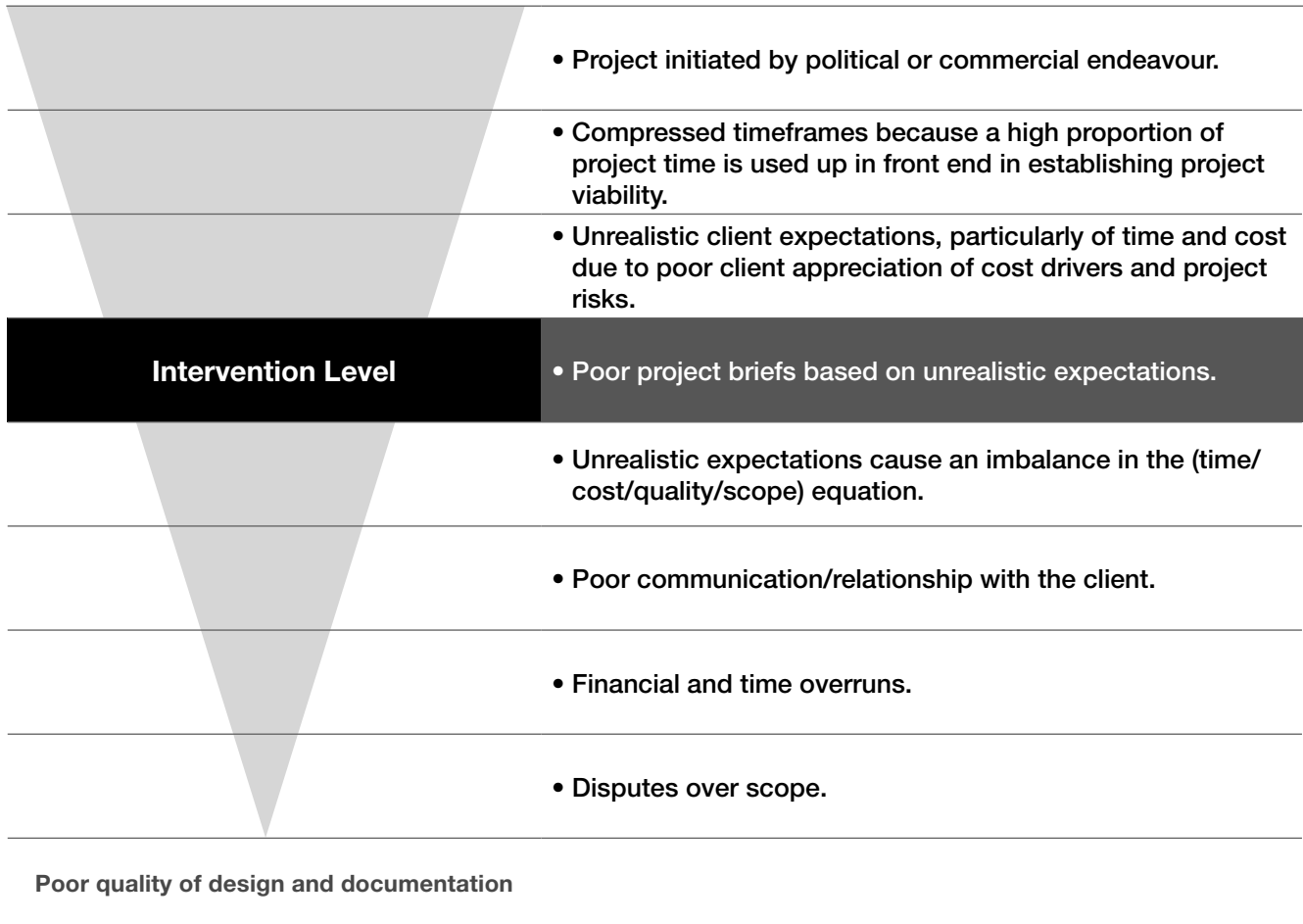
Whilst each intervention level has become a focus in reversing the declining standard of documentation, the recommendations also address the issues above and below the intervention level.

## The root causes identified by the Task Force are:

1. Inadequate project briefs based on **unrealistic expectations of time and cost**.
2. Lack of **integration** along supply chain linking the parties, and between project phases.
3. Devaluing of professional **ethics and standards** of business practice.
4. **Lowest bid** selection strategy rather than value for money.
5. Poor understanding and skilling in **risk assessment and management** processes.
6. Absence of an experienced client-appointed, overall **design manager**.
7. Poor understanding of **optimised and properly documented designs**.
8. Inadequate availability of, and recruitment of, **skilled and experienced people**.
9. Inadequate/ineffective use of **technology** in design and documentation (e.g. poor application of CAD techniques; technical specifications drawn from an organisation's data base but not tailored to the particular project).
10. Lack of appreciation of the benefits of **open communication**.

# 4.1 Project briefs

## Unrealistic project briefs



Typically, the client/financier will identify a business opportunity and prepare a business case to prove the viability of the project before briefing the consultant to prepare designs and contract documentation.

Whilst in the best cases, a project manager is appointed by the client to manage the delivery, in a high proportion of cases, the client/financier is overwhelmingly focused on the commercial or political outcomes and pays little regard to the downstream project delivery aspects, such as design detail, documentation and construction. In maximising narrow project benefits, unworkable demands and unattainable goals are imposed on both designers and constructors.

The practice of using “back briefs” or “return briefs” prepared by the consultant after discussion with the client is common in the industry – though less effective than commissioning a consultant for joint preparation of the brief.

Suzanne Wilkinson in her paper “Analysis of the Problems Faced by Project Management Companies Managing Construction Projects” outlined it in these words: *“When dealing with clients, companies appear to be finding it difficult to obtain a client brief, understand the client brief and are finding that this is a poor brief definition. The development of a workable brief is seen as a problem, as the client must have a clear brief if the project is to be successful. The trouble is that many clients want a land-based flying submarine.”*

Poorly prepared project briefs based on inadequate scoping and investigation are used to pass the responsibilities down to consultants who seem to be willing to take on the work on a low-bid basis.

The time and cost parameters set by the client are often based on wishful thinking rather than a thorough understanding of time and cost parameters required for effective delivery.



Consultants in this situation seem prepared to compromise ethical behaviour by “cutting the cloth to suit the purse” in a “get what you pay for” operation that leads to dissatisfaction, conflict and a poor standard of project design documentation quality.

## A vision for project briefs

- **Project briefs for planning and development of all significant projects will be comprehensive and accurate and will permit all parties to properly assess the work required and to confidently make documents that all parties can rely on during the commission.**
- **Industry accepted models for good project briefs will be in common use across the industry.**

This approach is well supported by the Australian Construction Industry Forum in its “Guide to Integrated Project Procurement” 06/09/01: *“Having established the needs of the project..., the Client, in association with the user, must develop a well-considered, complete brief for the Project.”*

Indeed, the Australian Construction Industry Forum has placed Client Brief and Project Establishment as Protocol No. 1 in its guideline document, “Improving Project Documentation”.

## Objectives for proper briefing

- The relationships between the parties that are professional and based on a win-win philosophy.
- Administration and management that are conducted in good faith.
- Generous descriptions of the project context and its background including clearly defined project objectives and any special drivers for the client.
- Comprehensive scope definition and functional requirements.
- Procedures to finalise the brief.
- Clear expectations about cost and time including a reliable cost plan that recognises the links between scope, time, cost and quality and incorporates appropriate contingency.
- Deliverables specified including full description of engineering and architectural services required.
- Comprehensive stakeholder analysis and processes to include architectural, engineering and construction participation in the development phase.
- Clients’ project management arrangements.
- Management of permits and approvals including legislation constraints.
- Clients’ expectation about particular disciplines required.
- Client involvement, decision processes, scope change management.
- Inputs; documentation; information, e.g. surveys, geotechnical, data sheets.
- Communication protocols (reports, meetings, relationships).

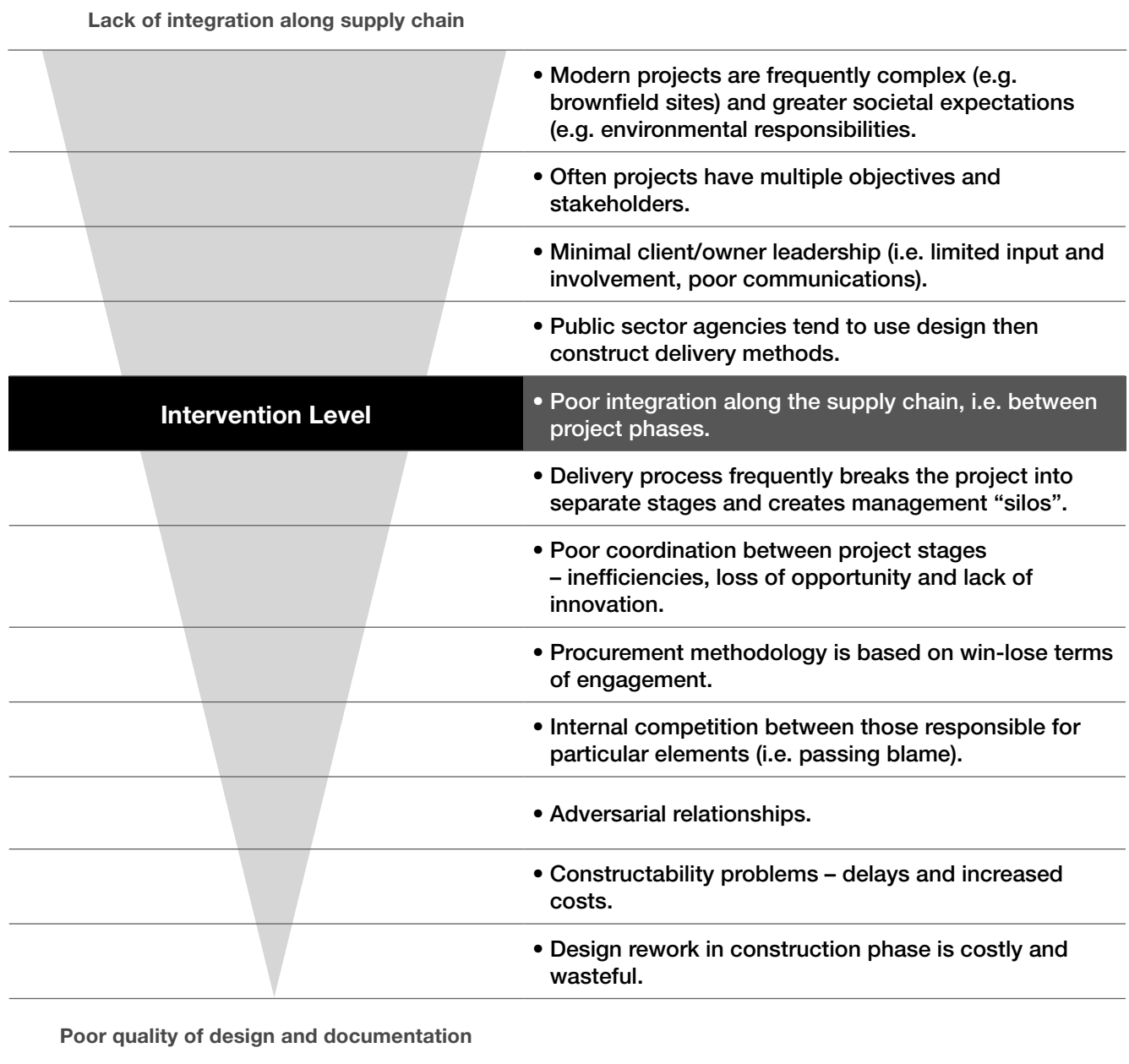
## 4.2 Project delivery

There is often a lack of effective integration of and feedback between delivery phases, which in turn impacts adversely on constructability, rework and innovation.

During design phase specialised elements are often inadequately drawn together which results in difficulty in interpretation, lack of clarity and confusion with specification and contract conditions.

The Rethinking Construction Task Force (Sir John Egan, 1998) states that “...this is indicative of a fundamental malaise in the industry – the separation of design from the rest of the project process.”

This climate, coupled with inappropriate risk/reward arrangements, reinforces the adversarial relationships which only compound the problems.



## Current status of project delivery

Modern projects are generally being delivered in a complex environment with diverse and competing expectations by the stakeholders and the community at large. There is less vertical integration within the supply chain. Typically clients are focusing more on initial total project costs and minimising input costs such as design, rather than minimising total implementation costs, let alone optimising whole-of-life project costs.

This view is supported by Love, Irani and Edwards in their paper "A Seamless Supply Chain Management Model for Construction". For example: "*The separation of the design and production process in projects has been widely criticised during the last fifty years or so, e.g. Simon (1994), Banwell (1964), Latham (1994) and Egan (1998).*"

and also "...calls for improved collaboration, integration, communication and coordination between customers and suppliers throughout the project supply chain have been the leitmotif of the published reports."

## A vision for better integration along the supply chain and between project phases

- **The decision making processes, from project inception to completion, will be directed toward common purposes by communication between all parties.**

## Objectives for proper project delivery

- Generate information once only in a way that can be shared across disciplines and down the supply chain more easily. Information that can be used in the operation and maintenance stage of the infrastructure lifecycle as well. For example, this may well involve the use of virtual projects generated through the use of 3D and 4D CAD.

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- Promote a range of procurement systems (with variations) appropriate to the circumstances of the project that share risks appropriately and compensate the parties for the risks taken.

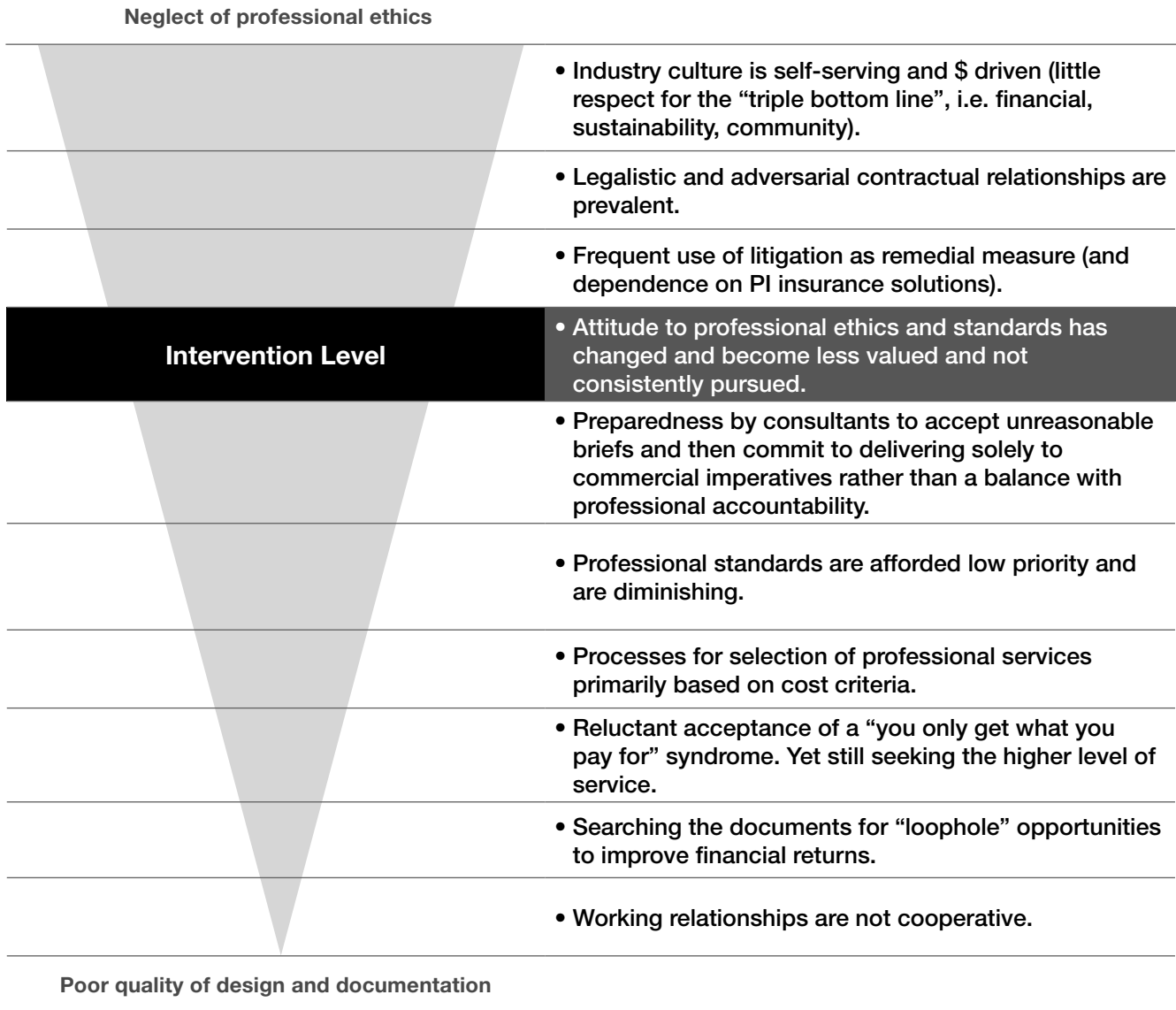
- 
- Emphasise, as far as possible, alliances and partnerships that are based upon the best outcome for the project overall and the mutual benefit of all contributors.

*"...by attaining maximum business process efficiency and effectiveness through inter and intra organisational relations" – Love, Irani and Edwards.*

- 
- Involve other participants in the supply chain in the earlier stages, not just contractors but sub-contractors and key suppliers.

Pearson states that: "...*(these) firms involve suppliers at an early stage in the project so as to acquire their expertise about design and procurement issues.*" (A Pearson, "Chain Reaction", *Building*, 12 March 1999 pp 54-55.)

## 4.3 Professional ethics and standards



### Current state of professional ethics and standards

Professional ethics and professional standards have become less valued and are afforded low priority as a result of commercial pressures and market competitiveness.

Consultants are tending to accept unreasonable briefs and then commit to delivering solely on commercial imperatives, rather than professional accountability.

Professional ethics are adequately defined by most industry bodies. However the term “appropriate standards” does not translate to an appropriate level of documentation to enable efficient construction of the project.

Relationships between client and consultant have become more contractual and adversarial, rather than cooperative. Most clients select a consultant on the low bid, whether or not appropriate services can be provided for that cost. A few informed clients have tried to address this but the outcomes have been disappointing.

The competitive low-bid environment corrodes professional ethics and professional standards among those operating in that environment.

Compromising ethics and standards allows underpricing of the necessary work to win the job. The consultant’s input is then limited by price, with an increasing likelihood of searching documents for “loophole” opportunities, and a legalistic and contractual approach to the professional relationship with the client.

How often do professional engineers and architects compromise the code of ethics of their professional bodies?

As members of the Institution Of Engineers, Australia, professional engineers are required to commit:

- to respect the inherent dignity of the individual
- to act on the basis of a well informed conscience, and
- to act in the interest of the community

Yet how often are the following Cardinal Principles of their Code of Ethics honoured by members of Engineers Australia:

- risk being managed in the interest of the community
- the responsibility of service to clients or employers
- practice being in accord with sustainability and environmental principles
- fairness in dealing with others
- relationships being on an open and informed basis
- knowledge being current to serve best the interests of the community, employers and clients
- awareness of the consequence of actions

Members of Engineers Australia in complying with their Code of Ethics should:

- “promote the principle of selection of consulting engineers by clients upon the basis of merit as well as fees, and should compete with other consulting engineers on the same basis”
- “should advise their clients or employers when they judge the project will not be viable, whether on the basis of commercial, technical, environmental or any other such risk...”
- “should not undertake professional work under terms and conditions that would compromise their ability to carry out their responsibilities in accordance with recognised professional standards.”

How much better would documentation be if these principles were universally applied?

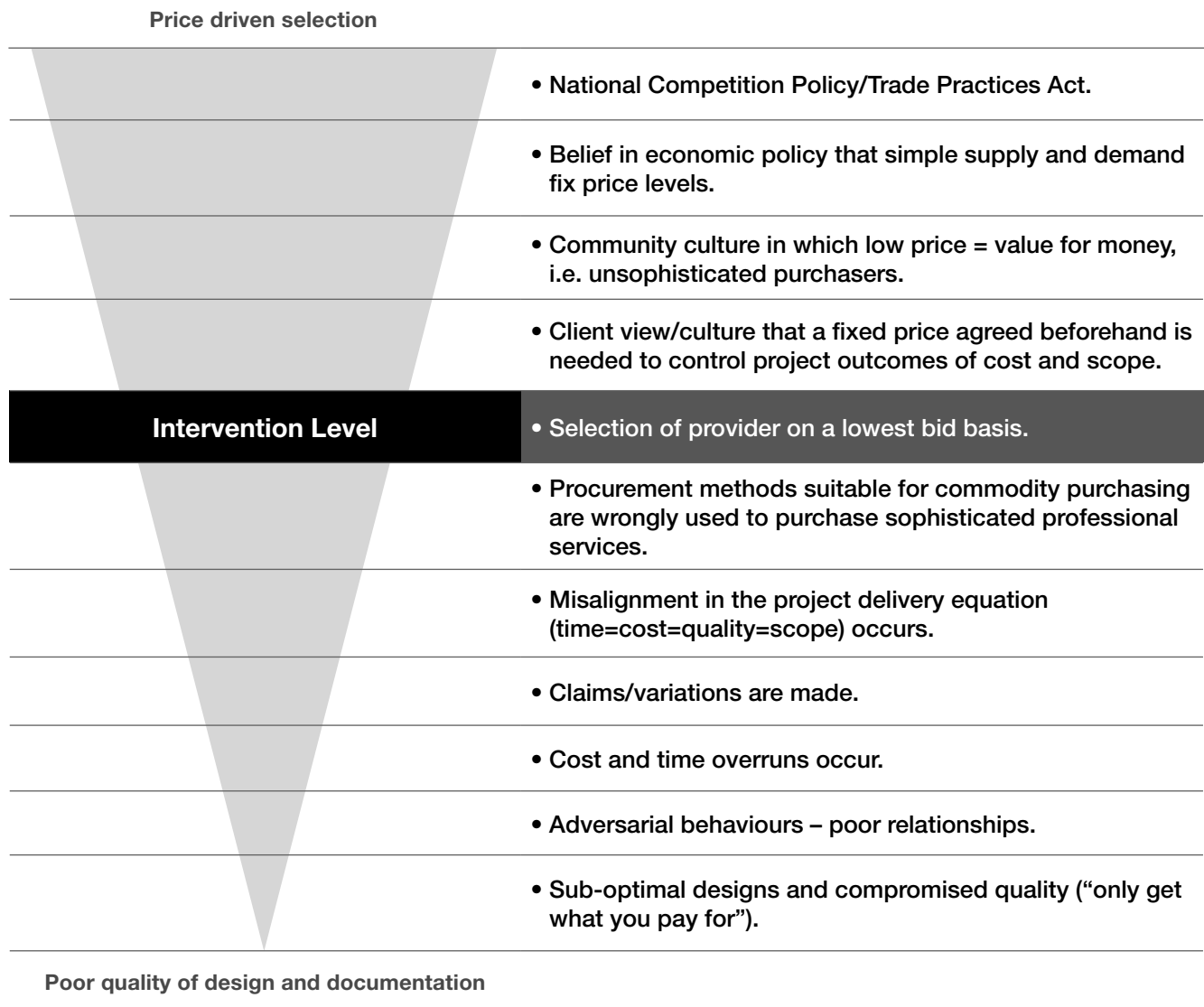
## A vision for professional ethics and standards

- **All parties will behave ethically and fairly toward each other and the professional relationship between the parties will be clearly understood and valued.**
- **The consultant’s responsibility to act in the best interests of the parties without compromising the needs of the client, the community and the profession by providing independent and informed advice will be recognised through equitable remuneration.**

## Objectives for ethics and standards

- The prime focus of consultants will be satisfaction of community and client needs but with due recognition of operational and whole-of-life requirements and a fair and reasonable approach by all parties to all matters contractual.
- “Fair and reasonable behaviour” – a concept now being underwritten in Australian law courts – will be written into contract documents and accepted as a normal standard.
- Current codes of professional and ethical behaviour (Codes of Practice) – modified where necessary – must be clearly understood and effectively implemented by all parties.
- Continuing registration will be conditional on competent standards of performance and compliance with recognised Codes of Practice.
- On projects of significant scale and/or complexity all consultants will be accredited under recognised industry schemes.
- The availability and/or cost of Professional Indemnity insurance may be linked to conformity with the Codes of Practice and the bidding of adequate fees.
- Professional bodies will encourage innovation.
- Professional bodies will actively promote and encourage high standards of ethical and professional behaviour by all industry participants, and encourage formal training and mentoring for practitioners – including undergraduate, postgraduate and in-service courses.
- Concerns about inadequate performance in the terms of recognised Codes of Practice will be resolved with the relevant National Registration Board and/or the relevant professional body under a common commitment to ethical behaviour.

## 4.4 Selection strategy and bidding philosophy



### Current selection strategies and bidding philosophies

Selection criteria are not always appropriate. Selection of consultants is often driven more by price than the required level of service and expertise necessary for a successful outcome.

In a competitive environment, particularly where price is the critical factor in the assessment of the bids, a consultant cannot include more than what is required by the brief. This leads to a reading down of the brief to provide minimum service for minimum fee and consequent tension between the parties when the work done does not meet project objectives.

As Tilley (“Design and documentation deficiency and its impact on steel construction”) observed: “*When design fees were reduced below the optimum level, project costs increased sharply due to increases in design*

*deficiency... Clients by their own actions were not getting the service their projects required, and this was leading to inefficiencies and additional project costs.”*

In some cases, the briefing document is inadequate does not clearly indicate the required scope of work thus compounding the problem.

Selection strategies do not generally recognise that there are both definable and indefinable extents of work required of the consultant, and require the consultant to bid a fixed price for the unknown.

**As a consequence adversarial relationships develop, optimum design is not achieved, programs are not met and quality is compromised.**

## A vision for effective bidding and selection strategies

- **All service providers will be selected on the basis of value and competency - and will not be selected on the basis of lowest price alone.**

This vision is supported by the work of Andi & Takayuki Minato (“Design documents quality in the Japanese construction industry: factors influencing and impacting the construction process”) which contends that, “... *The reduction in the level of design fees together with limited time made available to carry out the work can cause problems in the quality of design documents. Further, these problems have affected the efficiency of the construction process.*”

## Bidding and selection objectives

- Buyers will:
  - have a sophisticated understanding of the term “value” which incorporates:
    - *capability to deliver the required service to the nominated standard and within nominated time and cost constraints;*
    - *reliability and capability to perform in a non-adversarial manner;*
    - *social and environmental responsibility; and*
    - *whole-of-life cost implications.*
  - understand the links and trade-offs between time, cost and quality;
  - appreciate that with professional services, they will usually get only what they pay for;
  - appreciate that many designs are prototypes so that procuring design and documentation services for infrastructure facilities differs from purchasing a commodity;
  - appreciate that an understanding of the owners’ business is of value to a designer and this is enhanced by development of long term relationships, that is, by repeat business;
  - encourage innovation by consultants and fairly compensate them for initiative;
  - recognise reputations in the industry and demonstrable evidence of innovation;

- understand the risk profile / risk allocation being between the parties;
  - acknowledge the skills required for the project and the capabilities required of design teams proposed by prospective designers;
  - have access to reliable and proven techniques for bid evaluation and contractual performance measurement.
- Procedures for selection of consultants will be based on assessment of value for the service offered (e.g. using Qualification Based Selection, ACEA or techniques practised in USA and Canada based on the Brooks Act).

The Brooks Act (1972) sets out US Federal Government policy requiring any Federal department, agency, or bureau seeking professional services of an architectural or engineering nature from any firm or individual to “... *negotiate contracts for architectural and engineering services on the basis of demonstrated competence and qualification for the type of professional services required and at fair and reasonable prices.*”

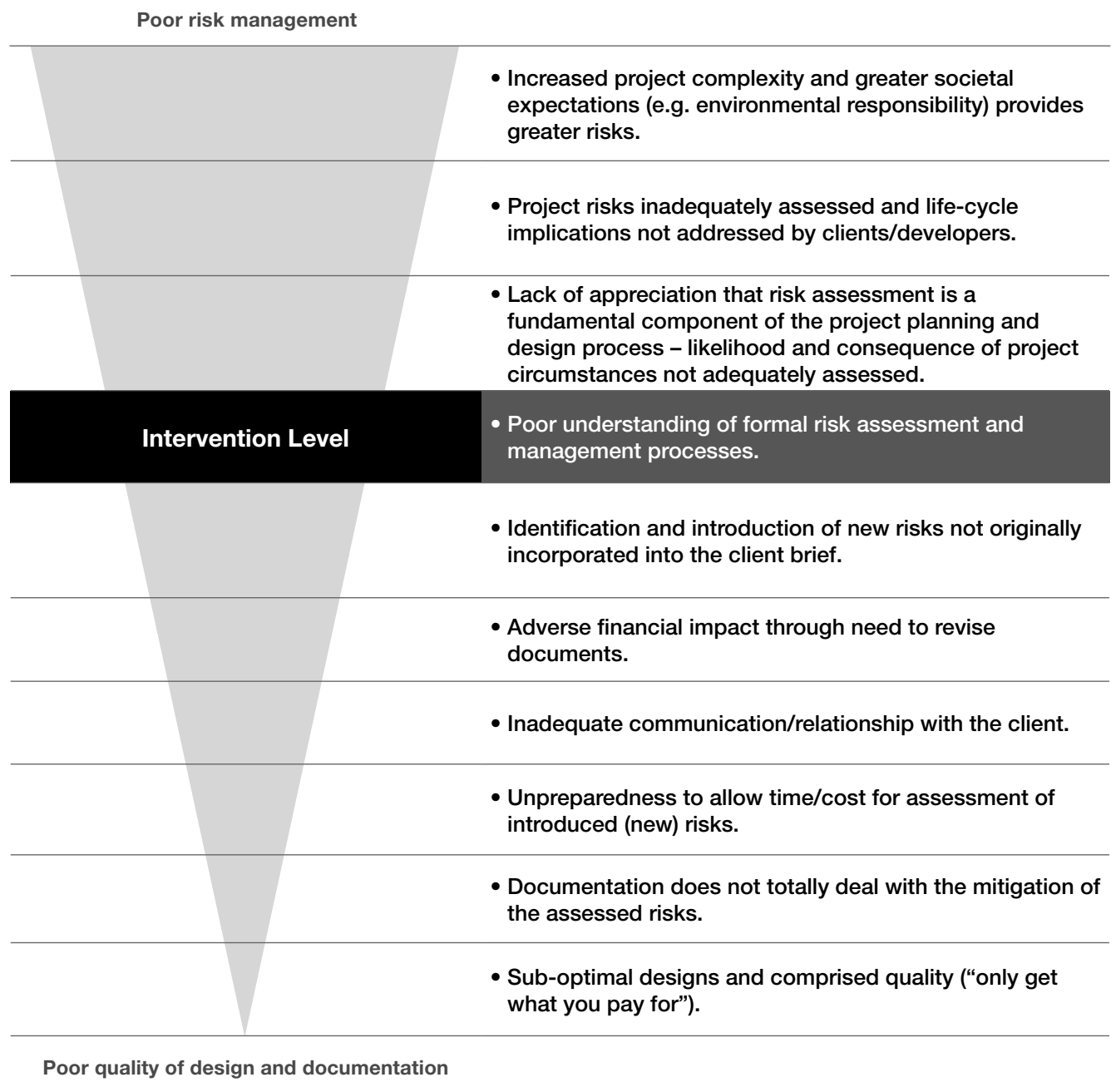
Specifically the agency head shall negotiate contract with the highest qualified firm ... taking into account the estimated value of the services to be rendered, the scope, complexity, and professional nature thereof. Should the agency head be unable to negotiate a satisfactory contract with the firm considered the most of the most qualified ... the agency head should then undertake negotiations with the second most qualified firm ... (and so on).

More than 40 of the United States are already (2002) using Qualifications-Based Selection (QBS) of professional architectural and engineering services along the lines of the Brooks Act.

- Bid documents (proposals) will address all of the selection criteria and will contain sufficient information to support a value-based selection process.
- Trade practices legislation will recognise that competition for design services based on capability produces a more competitive and economical project in the long run than competition on price alone. There needs to be acceptance of non-prescriptive industry guidelines on fees.
- The opportunity to compete on capability, quality and service will be encouraged.

*“Given that the work of architectural, engineering and surveying consultants is largely a ‘complex intellectual service’, many commissions are awarded on the basis of quality and price since it is recognised that you cannot get a quality service if just the lowest price is accepted.”* (CQSA, 1992). (“Balancing fee and quality in two-envelope fee bidding”, Derek S Drew, Sandy L Tang and Christine K Lui)

## 4.5 Risk management



### Risk assessment and management processes

- risks inherent in complex projects are not adequately identified, appreciated and/or fully assessed;
- the role of risk assessment in project planning and design processes is not fully recognised;

- formal risk assessment and management processes are poorly understood;
- there are a number of excellent risk management tools already in use in both private and public engineering and/or construction organisations.



## A vision for risk management in the future

- Identification and analysis of all risks and uncertainty inherent in the project and its circumstances will form an integral part of project management.
- All parties will assess and manage risk and will commit to using competent processes for identifying, analysing and mitigating risks at all stages of the project.
- Fair and equitable risk management and allocation processes will play a significant role in coordination and integration along the supply chain.

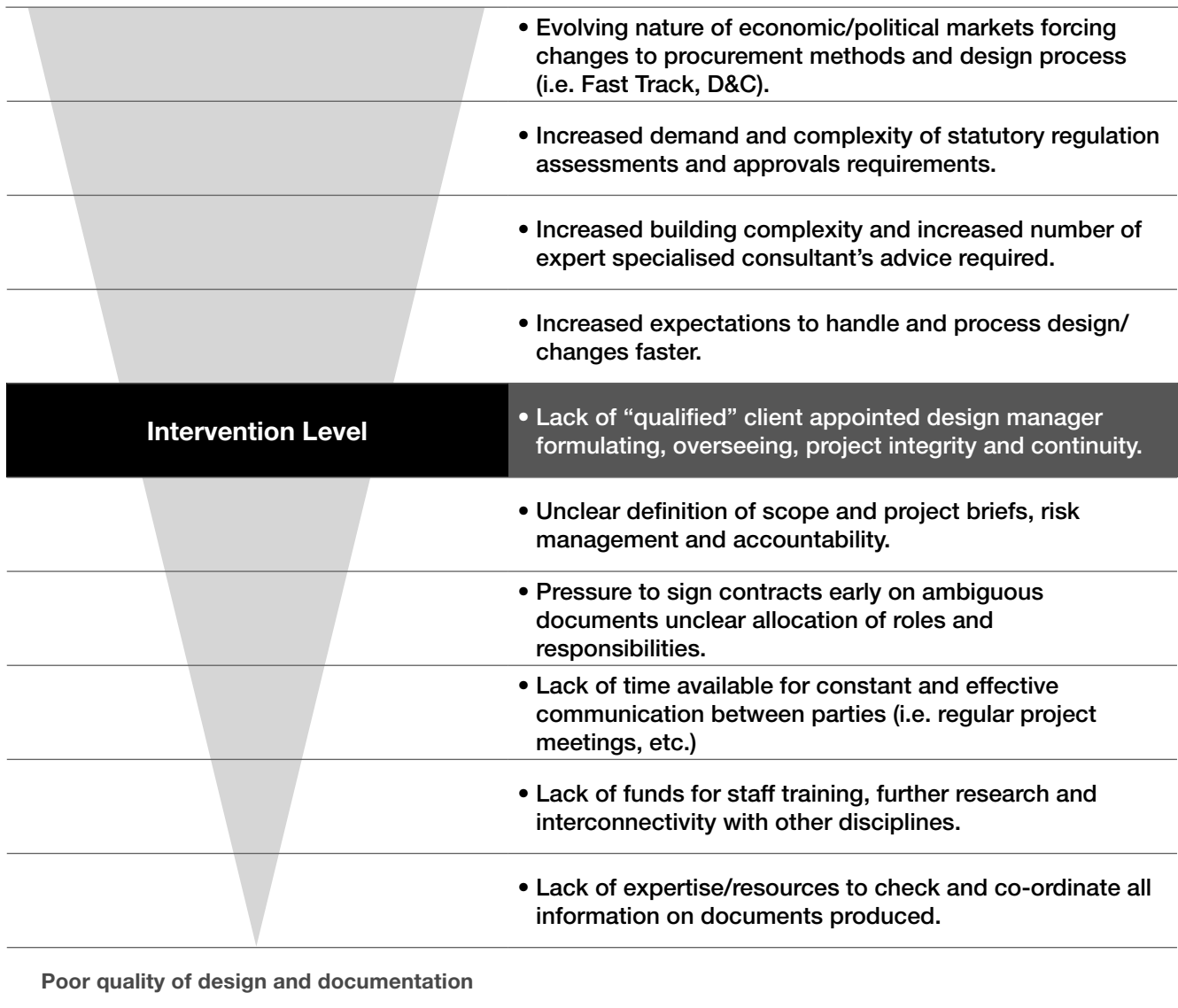
- A coordinated and structured approach to risk management will be achieved through regular formal risk management meetings and will be assessed as part of regular project management reviews.
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## Risk management objectives

- Project briefs will provide for risk assessment techniques to be applied early in all phases of a project, and for involvement of all parties along the supply chain at the appropriate stage.
- 
- Adequate time, resources and funds will be provided to ensure that risk assessment and allocation is a key part of all project development, management, and design processes – including provision for mitigating risks throughout the construction process.
- 
- Owners, consultants and constructors will be competent in the application of risk assessment and risk management techniques.
- 
- Value engineering techniques will be implemented in determining appropriate measures for managing and mitigating project risks. Value engineering techniques control:
    - identifying the major elements of a project,
    - analysing the functions each project element performs,
    - brainstorming to develop design alternatives to perform those functions,
    - evaluating the alternatives to ensure they do not degrade the project,
    - assigning costs (including lifecycle cost) to the most promising alternatives, and
    - developing the most promising alternatives into acceptable recommendations.
- 
- Specialist risk assessment staff will be engaged on all major and/or complex projects, or where project circumstances indicate that particular expertise is warranted.
-

# 4.6 Design management

Absence of client design manager



## The need for a qualified client-appointed design manager/coordinator

There is a need not fully recognised by industry for an appropriately qualified and experienced professional to be appointed as the Owner's design manager/coordinator with responsibility across all project phases from project initiation, planning and design, to construction and handover.

Greater complexity of projects, a much wider range of specialised professions, coupled with increased statutory requirements and approval steps have increased this need.

Economic and political factors often dictate fast tracking procurement methods (e.g. Design and Construct), but the project manager is neither assigned the full scope of this

broad responsibility nor engaged for the feasibility stages of project design.

Consequently, briefs for engagement of professionals do not clearly define scope, risk management, accountability functions and responsibilities.

Time and cost pressures restrict the time necessary for review and negotiation of scope of professional services including their interface with all other components of project design, and often lead to pressure to sign-up on ambiguous documentation and unclear statements of roles and responsibilities.

## A vision for the client's design management

- **Continuing client involvement in the design management and a strong relational ethic will be fully ingrained in industry culture.**
- **The client's design manager/coordinator will steer project design through all project phases from business case to commissioning; ensure alignment with project objectives; and ensure integration and coordination of the design effort with all parties through all stages of the project.**

## Objectives for effective design management

- Clients will be fully aware of the importance and benefits of the roles in their project team for Project, Design, and Construction Management.

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- The client's design manager will be an appropriately qualified and experienced professional.

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- The client's design manager will be the principal co-ordinator of specialist consultants and will maintain a consistent approach to obtaining project approvals and permits and to eliminating potential roadblocks.

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- The design management team will be thoroughly briefed on the client's functional requirements and budget, coordinating the various design and documentation professionals and the flow of information to ensure optimum and timely solutions.

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- Group problem solving techniques involving all parties should include value management, value engineering, risk management and information management.

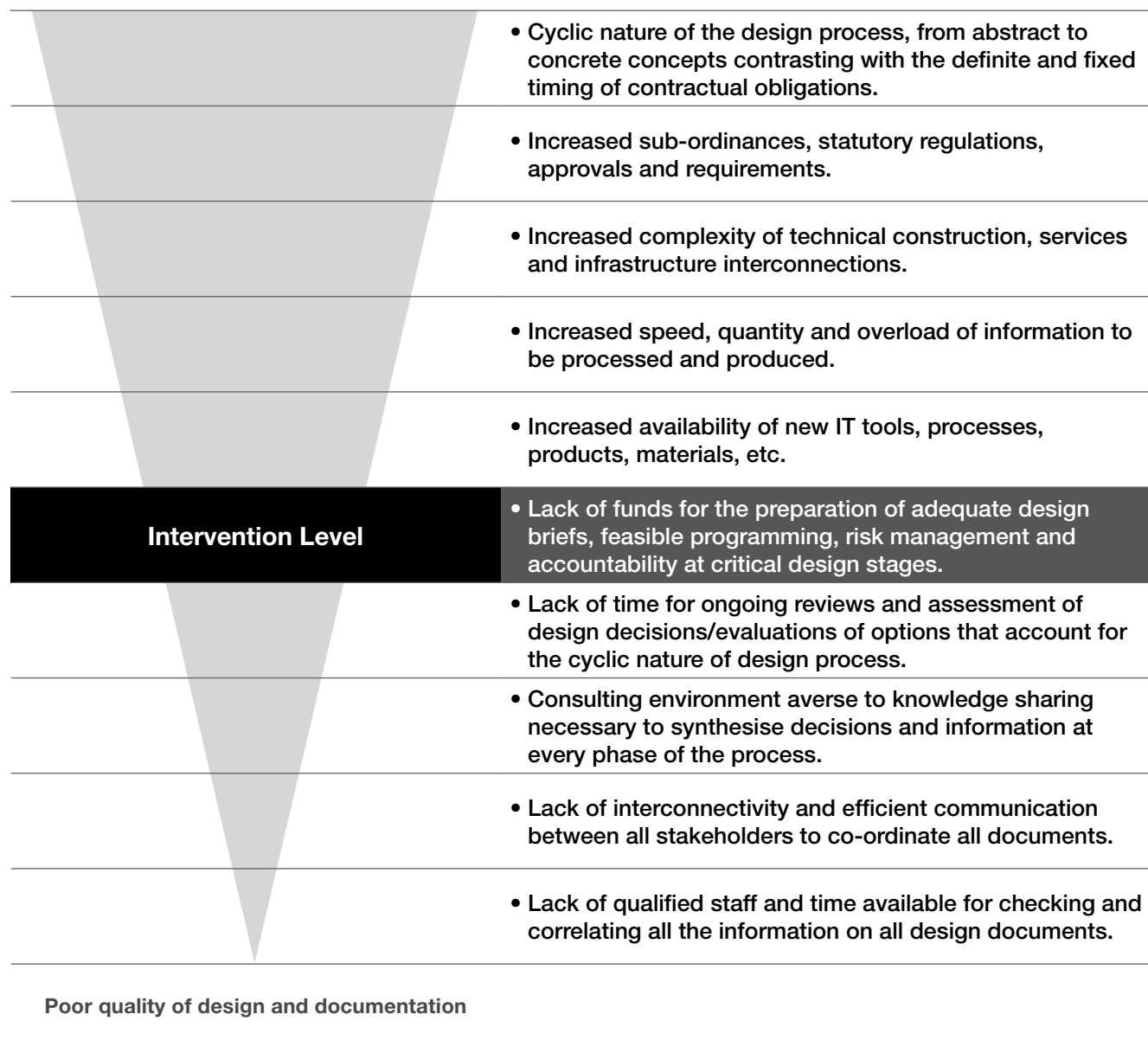
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- Continuity of project management staff will be targeted from inception to commissioning – availability of the same staff to design and documentation consultants will be recognised as vital, with accountability and transparency across all disciplines maintained during all phases of the project.

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## 4.7 Design process

### Poorly documented designs



### Lack of funds for adequate design briefs, programming, risk management and accountability at critical design stages

Inadequate fees and tight, unrealistic programs, curtail the concept and schematic phases of the design. Thus the design concept may not be optimised, resulting in the client paying more than otherwise necessary.

At the other end of the design phase, detail design and design review may be similarly compromised

Computer-aided analysis, design and drafting have

all led to an increase in productivity, but the need for communication and coordination has not diminished and still takes as long as it ever did.

*This area of research is currently being addressed by a major international effort, called the International Alliance for Interoperability (IAI), which has developed a standard called the Industry Foundation Classes (IFC's). This standard provides specifications for a set of standardised object definitions, which allows the transfer of information between software applications. "A Survey On The Impact Of Information Technology On the Canadian Architecture, Engineering And Construction Industry", Hugues Rivard,*

Assistant Professor, Concordia University, Canada

In addition, most projects are now more complex and are the subject of increased statutory regulation, governance and approval requirements.

Computer-aided analysis, design and drafting necessitate increased levels of checking due to the “black box” nature of much of the engineering, architectural, drafting, and quantity surveying software, which allows relatively inexperienced staff to carry out the work, and the use of “cut-and-paste” in CAD that results in many errors. CAD has also removed the opportunity for the progressive checking of drawings by both the drafter and the engineer. Despite the need for more checking, the current design environment often leads to less checking.

### A vision for the design process

- **The benefits of spending sufficient time and money in project planning and design will be widely understood and accepted by clients, owners and financiers – they will fully appreciate that an additional \$1 spent in design optimisation has the potential to save \$10 in construction and \$100 in operating costs.**

*“93% of contractors indicated that design and documentation quality did influence the price submitted for a tender, while 75% of contractors indicated that it also had an influence on the time allowed for a project”. (“Engineering Documentation Standards”, Institute of Engineers Australia and AISC Special Issue, December 2000)*

### Objectives for the design process

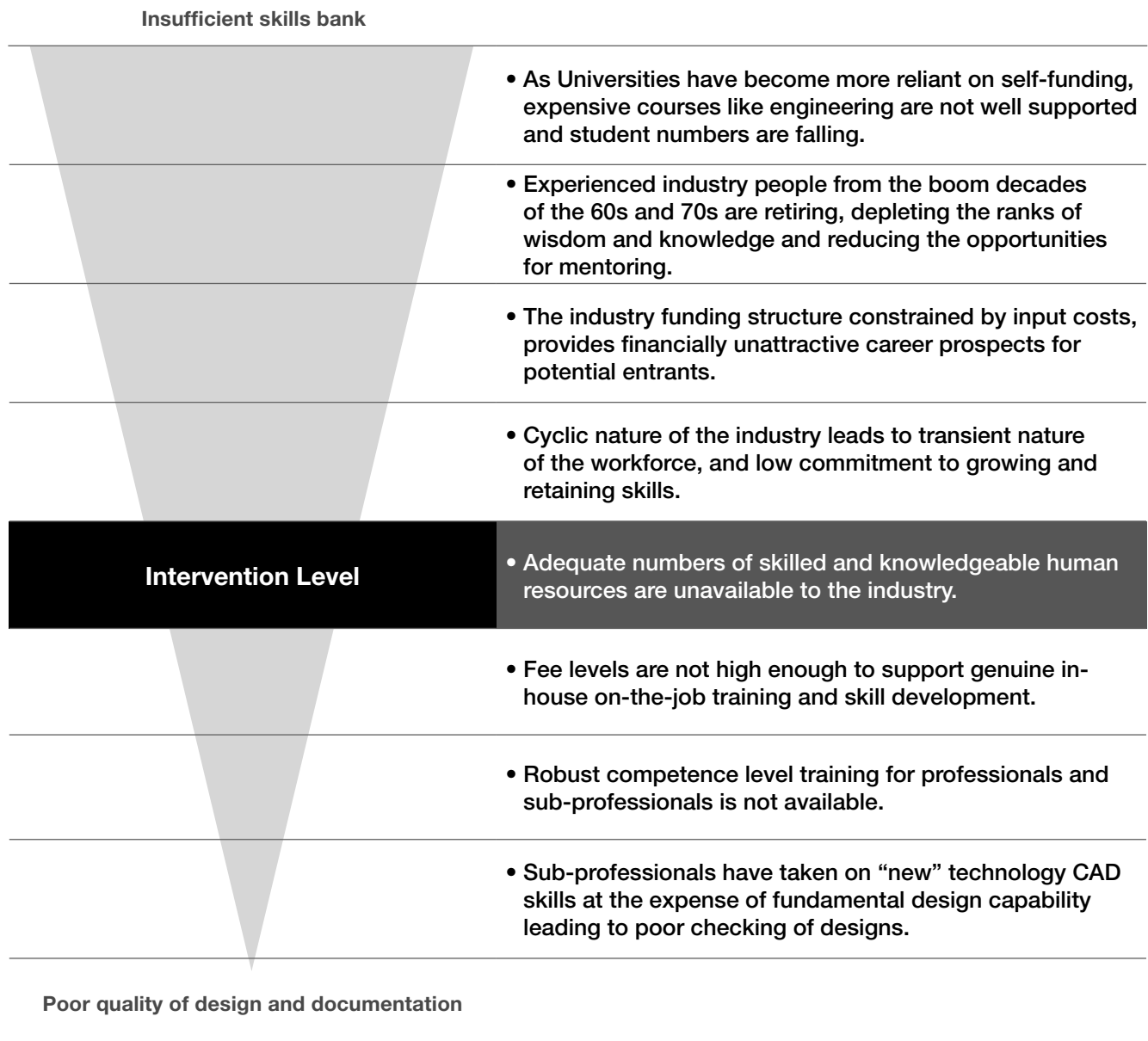
Clients, owners and project financiers will:

- understand that design is an iterative process and an array of options needs to be identified, tested and costed before the optimal design is confirmed;
- understand that options need to be tested through value engineering processes to ensure that project objectives will be fully and efficiently satisfied;
- allow adequate and reasonable time for the design process to run its full course;
- appreciate that purchasing consulting services is not like purchasing commodities where quality is a constant and price can be negotiated;
- appreciate that making project cost savings by cutting costs in the design phase is illusory.

Designers will:

- draw the client’s attention to any need for analysis of alternative project design features and the potential benefits available;
- carefully check all designs for completeness and accuracy;
- ensure that experienced practitioners play a role in the documentation process;
- allow appropriate time frames to develop concept design, review and then carry out detailed design;
- take a pragmatic and appropriate attitude to development of a design that meets the buyers functional needs and is constructible.

## 4.8 Human resource capacity



### Skill shortages and lower staffing levels

The construction industry is heavily dependent on development experience and retention of personnel having sophisticated experience, skills and knowledge.

However, universities are attracting fewer and fewer talented students to engineering and architecture courses. This, together with rapidly rising skill requirements and the retirement of ageing stalwarts of the industry, is leaving the industry in a depleted state to meet the challenges.

Further, due to the competitive low-fee focus in the industry, professional and para-professional personnel are poorly rewarded and underdeveloped due to low investment in training, skills, and knowledge development.

This issue is linked to declining fee levels and has a direct impact on the declining experience of staff; the main issues are as follows:

- *low fee levels mean that staff training expenditure is reduced;*
- *apprenticeships for draftsmen have almost disappeared; relevant tertiary training is difficult to find and the courses offered are often limited in their relevance to the industry; and*
- *there has been a decline in the level of on-site training for both engineers and draftsmen. (“Engineers, documentation and litigation”, A Baigent, 2000).*

As an inevitable result of inadequate numbers of skilled and knowledgeable resources, design and document quality are adversely affected and the community is suffering enormous losses.

*“Findings from the interviews ..... revealed that a large portion of the rework costs experienced in the projects were attributable to the poor skill levels of the clients’ project manager, the design team and subcontractors – training and skill development were not issues that the consultants addressed, primarily because of the associated costs involved - the lack of training and skill development with technology applications such as CAD adversely affected motivation levels amongst those employees working on projects. (“Determining the causal structure of rework influences in construction”, P Love et al, 1997)*

*“Both contractors and designers indicated the increasing use of junior and inexperienced staff to carry out the design function - one of the major concerns of clients, contractors and other consultants (in relation to documentation quality) is the apparent lack of knowledge of designers in relation to practical building and construction methods (constructability), not only when they are commencing their careers, but also throughout their careers” (“Design and documentation deficiency and its impact on steel construction” - (P Tilley, 1998)*

## A vision for human resources

- **Design and documentation personnel available across all disciplines will be well trained, experienced and competent, and will be properly recognised and rewarded for the skills and responsibilities required.**
- **Continuing professional development (CPD) will be accepted as an essential requirement for ensuring that staff maintain up-to-date qualifications and competency standards.**
- **Mentoring will be strongly encouraged and recognised as an essential practice to make sure that relevant experience is passed on to less experienced personnel.**

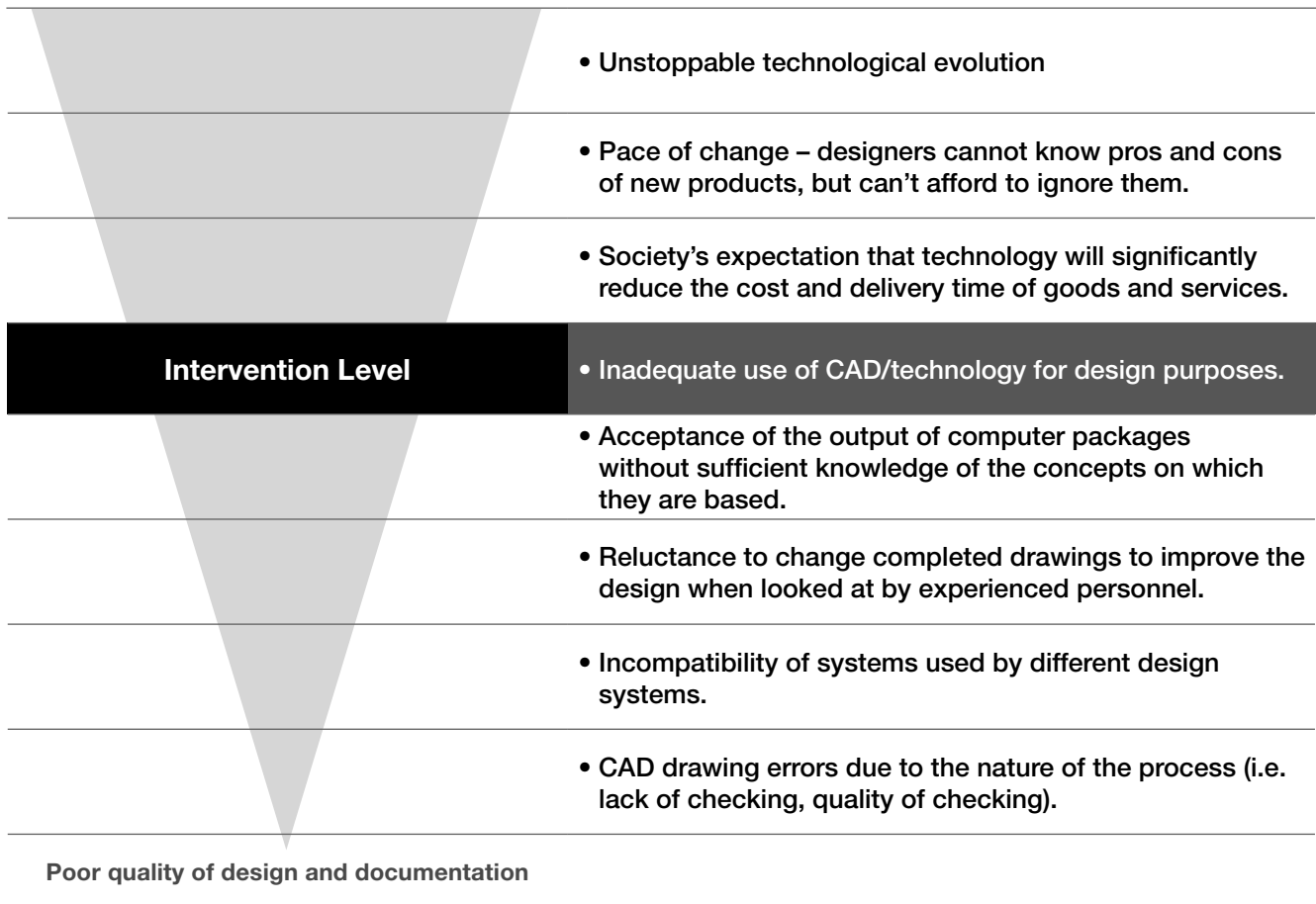
*“Drivers of Change (include) commitment to people: this means not only decent site conditions, fair wages and care for the health and safety of the work force; it means a commitment to training and development of committed and highly capable managers and supervisors; it also means respect for all participants in the process, involving everyone in sustained improvement and learning, and a no-blame culture based on mutual interdependence and trust.” (“Rethinking Construction”, The Egan Report, 1998)*

## Objectives for human resources

- The level of skill required for the industry will be recognised by clients and rewarded appropriately.
- Undergraduate and graduate programs at colleges and universities will closer reflect the needs of the industry and will be developed in close co-operation with industry associations and relevant client groups.
- Opportunities will exist for trainees to combine work and study through part-time courses.
- Less experienced personnel and trainees will be included in design teams as an essential practice for developing their experience and competence, and for ensuring the long-term viability of the industry.
- Professional bodies will implement strategies and programs for professional development of their members (design professionals etc).
- Continuing professional development will be mandatory, well planned and assessable as a condition for continuing involvement in the industry.
- Research and development activities will be more widely available, incorporated into the time allocation for professional staff and supported by appropriate fee levels.
- All professional and technical support staff will be comfortable working with IT/CAD and will be familiar with 3D and 4D modelling of their designs.

# 4.9 Technology

Ineffective use of technology



## The status of CAD and the technology revolution

The evolution of technology is rightly unstoppable and inevitable.

CAD promised the paperless office, yet we now consume more paper than ever before. Technology promised to improve efficiency, yet now there is so much information that there is little time to sort it, let alone prioritise and check it.

Computers have helped to produce more documents at greater speed, but they have also created the chances of producing uncorrelated, 'black box' solutions which are either incorrect, ambiguous or inappropriate for the situation. The possibility of errors has multiplied and the quality of design and documentation has declined.

This is largely due to the rise of "machine operators" who are not necessarily competent designers but know how to operate the complex software albeit not understanding nor delivering design quality. ("Engineers, Documentation and Litigation" (clause 3.5 – Inappropriate reliance on technology), Dr Andrew Baigent in the AISC – IEAust Special Issue *Steel Construction*, Vol 34, No 4, Dec 2000)

Design by computer distances the designer from the real issues and discourages independent checking by knowledgeable practitioners and cross-checking with guides, standards and other relevant documents. These result in design that is not holistic but rather a design segmented into layers lacking integration and not achieving design objectives. Unique and efficient design solutions must be by a qualified and experienced designer. Reliance on computer generated solutions without designer judgements will lead to solutions of a prescribed nature that invariably produce inappropriate solutions.



So far, technology has not fulfilled its promise to promote greater efficiency and better design but rather has contributed to poor quality of project design documentation.

## A vision for managing technology in the future

- **The building and construction industry will embrace technological change – eager to capitalise on the potential that technology offers for achieving challenging objectives, continuous improvement and long-term viability.**
- **The role of technology in the delivery of projects will be thoroughly understood and encouraged by all stakeholders.**
- **Accredited software packages will satisfy the following objectives:**
  - **assist in the delivery of best quality design and documentation;**
  - **facilitate system compatibility and interchange;**
  - **include training modules to maximise efficiency and effectiveness of their application.**

## Objectives for managing technology

- Projects will be supported with integrated virtual models that will be used throughout the design and operation phases.

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- Communication between all parties will be effective, well tried and very open in nature.

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- Design and communications software, hardware and computing networks used throughout the industry will be thoroughly compatible.

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- Accurate and accountable technology and communication will be available - mitigating risk and ensuring a higher standard of documentation.

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- Sharing project information via sophisticated computer models will provide more accurate data on the status of the documentation at any given time.

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- All designers will be able to share digital information models in a single database - constantly updating information rather than each relying on their own systems.

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- Design documentation will be directly linkable to component manufacturing processes and on-site construction and be available post-construction for facility management systems.

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- Users of sophisticated systems will be competent design and/or documentation professionals first and foremost, with a good understanding of the principles of design, merely using technology as the most appropriate method to achieve their purpose.

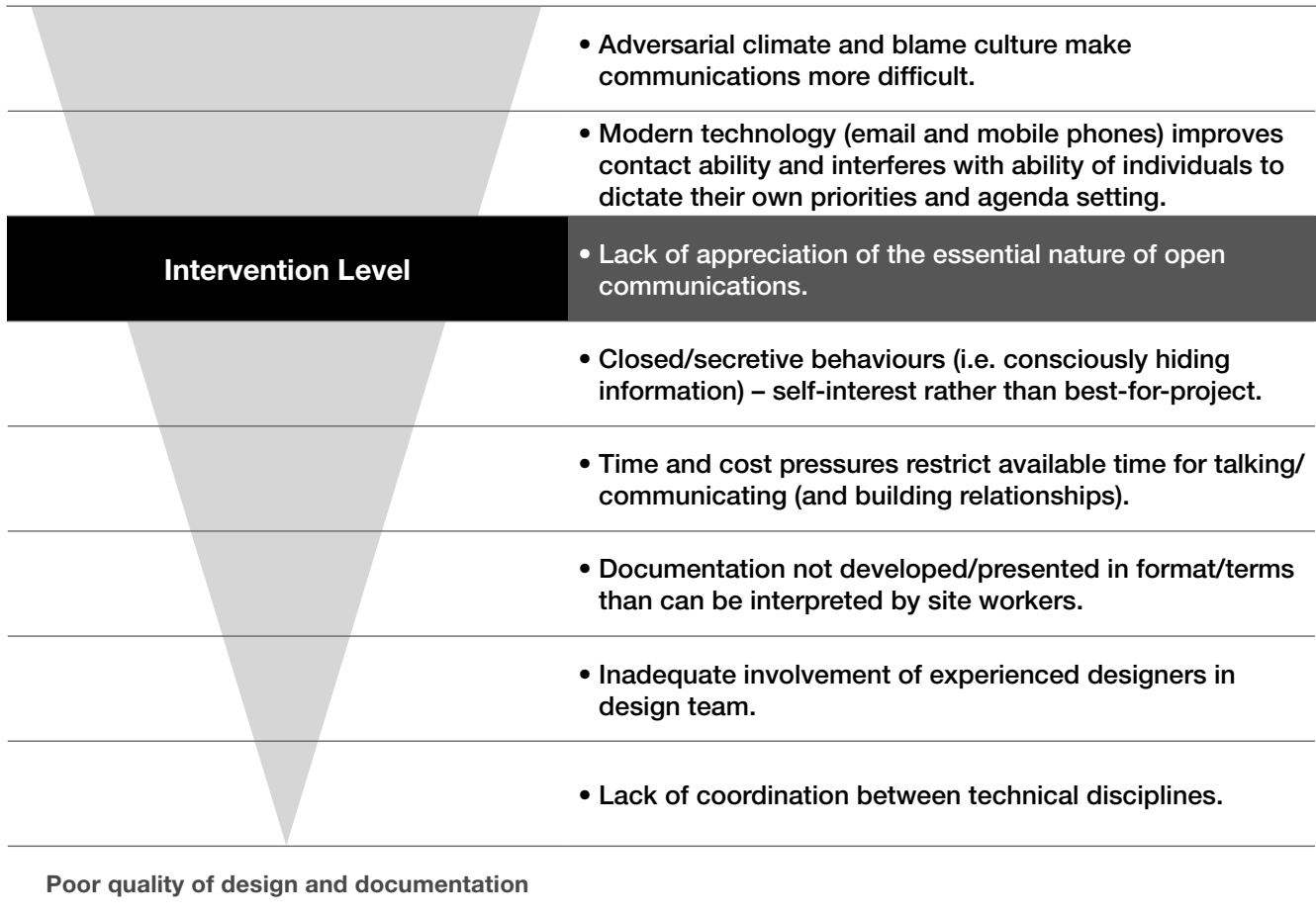
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- Consultants will be aware of the need to ensure wisdom and expertise is incorporated throughout the design process - ways of progressively reviewing and overseeing the design by skilled practitioners are an integral part of the overall process (e.g. for incorporating constructability features and owner input).

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# 4.10 Communication

**Lack of open communication**



## Lack of appreciation of essential nature of open communications

Communication in the building and construction industry is constrained as a result of the adversarial climate and the blame culture this climate has engendered. This is one of the consequences of extremely tight time and cost pressures in a very competitive environment.

*“The reluctance to interact is also fuelled by the perception that adversarial relationships must exist as they historically have between designers and contractors – adversarial relationships arise when parties blame each other, even when it is impossible to assign blame to one party exclusively.”* (“Leveraging specialty-contractor knowledge in design-build organisations”, N Gil et al, 2001)

Closed (and even secretive) behaviours with a focus on self interest (at the expense of best-for-project interests) are taking precedence over the essential requirements for open communication between all parties in the very complex project environment.

Time and cost pressures severely restrict the time available for oral communications – so essential for making sure that issues are identified, thoroughly analysed, talked through and the outcome understood in the same terms by all parties.

Improved contactability provided by modern devices (mobile phones and email) interferes with the ability of individuals to define and implement agreed programs of action or to progress priority activities.

*“Poor communication and inadequacies in interactions between designers and other parties contribute to rework in Australian projects.”* (CIDA, 1995)

*“(Participants in project meetings) fail to recognise explicitly what needs to be communicated and when.” (“Leveraging specialty-contractor knowledge in design-build organisations”, (N Gil et al, 2001)*

*“The manner by which drawing files are being sent appears to be so uncontrolled as to be bordering on dangerous.” “Engineering Documentation Standards”. (P Cocciardi, 2000)*

## A vision for open communication

- **It will be accepted that the primary ingredient of successful project delivery is people working cooperatively together, sharing the same vision and objectives for the project.**
- **The contracting arrangement will be framed around goodwill and fair dealing in an open communication environment.**

*“Clear communications through oral and visual means will be the backbone of good project relationships.” (“Architectural management – an evolving field”, S Emmitt, 1999)*

## Objectives for improving communication:

- All project documentation will be easily intelligible to those parties along the supply chain who need to use it.
- For each project a communication plan will be established at the outset defining the roles of the parties and how their work will be facilitated by open communications.
- The effectiveness of project communication plans will be assessed as part of regular project management reviews.
- Face-to-face communications will be the basis on which common understanding and good relationships are developed and fostered.
- Information technology will be the tool used to improve and simplify communication rather than a means of merely transmitting ever increasing quantities of information at ever increasing speeds.
- Undergraduate, post-graduate and in-service training programs for industry professionals will include training in communication and relationship building techniques.

# Section 5: Recommendations for Industry Change

## Setting benchmarks – A vision for the future

To assist in identifying solutions for the various causes of the problem the Task Force has defined a vision for the future of project design documentation:

- When benchmarked against similar industries in leading OECD countries, the building and construction industry will be highly efficient and competitive, in a large part due to the care and skill applied to the development of project design documentation.
- Project designs will be characterised as innovative, fit for purpose and constructible because of the skill, knowledge and advanced technology that is applied.
- Documentation will fulfil the owner's requirements, and be thorough, accurate, unambiguous, and easily communicated across the full spectrum of the construction industry's workforce.
- An open learning environment facilitated by open communications will exist in the industry.
- Participants in all sectors (owners, clients, project managers, designers, detailers, constructors, suppliers and users) will:
  - be acutely aware of the need to maintain high standards of design and documentation, and
  - have a full understanding of the factors that bring about best standards of design and documentation.
- The industry at all levels will embrace the opportunities provided by information technology and will lead the way in the development and adoption of compatible systems and software that better support the needs of all parties.
- Sharing of information by open communication, consistency, and continuous improvement will be hallmarks of the culture of the industry – this will be facilitated by an awareness of the need to build skills and knowledge in all areas including project documentation and management.
- This culture will support fair dealing and operate in a spirit of good faith. Fair and equitable remuneration will be available for all parties. Judicious use will be made of industry related legislation and regulation supported by codes of practice so as to narrow the performance band.

## A “no blame” approach to the task

Industry Participants	Part to Play
<b>Project Owners</b>	<ul style="list-style-type: none"> <li>• provision of project briefs</li> <li>• consultant capability and value ahead of lowest fees</li> <li>• effective risk management</li> </ul>
<b>Professional Consultants</b>	<ul style="list-style-type: none"> <li>• competent deliverables ahead of the lowest fee</li> <li>• professional ethics</li> <li>• recruitment and on-the-job training</li> </ul>
<b>Constructors and Suppliers</b>	<ul style="list-style-type: none"> <li>• competent performance ahead of the low bid</li> <li>• cooperation ahead of adversarial behaviour</li> <li>• recruitment and on the job training</li> </ul>
<b>Financiers and Lawyers</b>	<ul style="list-style-type: none"> <li>• a fair contract between equals rather than a tight (outdated) master servant contract</li> <li>• cooperative approaches rather than adversarial</li> </ul>

In a spirit of cooperation and communication across the industry, the issues, the root causes and the recommendations are set out in a no-blame non-adversarial manner. Nevertheless, certain sectors of the

industry will need to take an active part in resolving a number of the issues:

In developing solutions to the 10 root causes set out in Section 4, two other factors influenced the approach of the Task Force:

- Firstly, there is significant overlapping of, and interaction between, the effects of each of these individual root causes.
- Secondly, several remedial activities would be beneficial in the resolution of all or most of the 10 individual root causes, such as:
  1. Make sure that the whole of the industry and all of its players are fully aware of the current situation, the consequent waste of resources, and an increasing difficulty with the “do nothing approach”.
  2. Promote the need for a change in culture, across the industry.
  3. Reinforce existing codes of practice, guidelines for industry, and legislation and regulation (modifying where necessary and in some cases assembling new).
  4. Strengthen the requirements for continuing professional development, tertiary training and in-service/on the job training.
  5. Reinstate equitable remuneration for professional design services within a value for money equation.
  6. Improve project delivery across the board.

To address the root causes, the Task Force has grouped its recommendations around four major categories:

**5.1 Project briefs – including some discussion on:**

- Risk assessment and allocation
- Communication practices

**5.2 Bidding philosophy and a selection strategy for consulting services**

**5.3 Project delivery – including:**

- Professional ethics, standards and accountability in business practices
- Risk management
- A client-appointed overall design manager
- Design process – what is required to optimise designs and provide quality documentation
- Adequate human resources
- Adequate and effective use of technology, e.g. CAD
- Effective communication practices

**5.4 Implementation strategy**

- Vision for the construction industry
- Building stakeholder support participation
- Managing the task
- Communicating and marketing the message
- Changing the industry culture and modifying behaviour
- Continuous improvement
- Everyone to play a part

## 5.1 Project briefs

**Root cause: Poor project briefs based on unrealistic expectations**

### Guiding principles

*(\*Refer to section 4.1 for the Task Force's vision and objectives for project briefs)*

The purpose of the project brief is to define, limit and allocate the uncertainty and risk associated with the project.

The project brief stage is an important and separate stage in the project procurement process for which the client has primary responsibility.

The project brief should be completed before the preparation of the consultant services brief.

### An adequate brief

The subject of inadequate briefs was tackled by the Australian Construction Industry Forum and Australian Procurement and Construction Council Inc. in 2002. The aim was to identify the key issues in the apparent decline in project documentation quality over recent decades for government as the client and buyer of services and the construction industry as the seller and supplier of services. The report, "Improving Project Documentation – A Guide to the Current Practice" (March 2002), sets out five sets of principles and protocols. While recognising the merits of this report, we believe a broader document placing the whole project initiation stage in context is required. We reviewed CIDA's "Construction Industry Project Initiation Guide for Project Sponsors, Clients and Owners" (CIDA 1994) for this purpose.

Briefs have been addressed by the Task Force based on a review of current practices and definitions of what briefs are, for example as defined in the above ACIF/APCC document.

The Project Initiation Guide may well be sufficient to set the norm for client project managers and professionals to develop effective project briefs. If so, our industry needs to promote understanding and widespread use of it.

The CIDA Project Initiation Guide recognises a three-step process in the formation of a project brief:

1. The concept stage evaluation brief:
  - To identify constraints
  - To describe a range of options
  - To select a shortlist based on analysis by functions/ use; cost/benefit
2. The definition stage brief containing:
  - A description of the preferred option
  - Cost targets
  - Time requirements
  - Quality considerations
  - Redefinition of the functional, physical and financial constraints and objectives for the project
3. The project delivery brief which is expected to cover:
  - The enterprise objectives for the project
  - The functional objectives – what the project must do
  - The functional constraints
  - A summary of the feasibility and risk analyses
  - Details of planning approvals
  - The project implementation plan, actions and schedules
  - The procurement plan
  - A cost plan
  - The project documentation, description and illustrative definition

Recommended Solutions	Actions
<p><b>Standards for project briefs</b></p> <p>Develop comprehensive, succinct benchmark standards for project briefs.</p> <p>Adopt and/or modify a set of protocols acceptable across industry for the development of project briefs e.g. the 2002 APCC/ACIF or the 1994 CIDA or the current Capital Works Management Framework (DPW – Qld).</p> <p>Establish clear definition of terms.</p>	<ul style="list-style-type: none"> <li>• Review and establish industry based guidelines/protocols for effective briefs, including checklists and quality case study examples.</li> <li>• Engage Government agencies, significant private sector clients and industry associations (e.g. Property Council) as stakeholders in the process.</li> <li>• Consider engagement of professional assistance at this time.</li> </ul>
<p><b>Client and industry awareness of project briefs</b></p> <p>Clients need to be made aware of the benefits of, and flow-on from, effective project briefs – particularly with project owners who have most to gain (or lose). This is particularly relevant for one-off clients.</p>	<ul style="list-style-type: none"> <li>• Present industry seminars, forums and training sessions on the benefits of developing briefs, and the skills required to develop them, with topics such as: <ul style="list-style-type: none"> <li>- the use of independent consultants in the preparation of the brief where the client lacks the skill or experience in-house</li> <li>- proper scoping, which is essential for accurate planning</li> <li>- conducting general awareness program on effective Project Briefs and Consultants’ Services Briefs</li> <li>- clear client objectives and key drivers for the project being articulated to allow all service providers to respond to the true project goals</li> <li>- a comprehensive brief flowing on into effective risk management</li> <li>- including a Recommended Project Cost Plan and Project Master Program in the project brief</li> <li>- importance of identifying site restraints and existing infrastructure and services</li> </ul> </li> <li>• Gain commitment of professional associations, client bodies, property council and consultants teams to the importance of ensuring an adequate brief is completed before commencement of a formal commission.</li> <li>• Encourage professional service providers to include finalisation and sign-off of brief as part of Quality Plan.</li> </ul>

Recommended Solutions (cont)	Actions (cont)
<p><b>Specialised expertise</b></p> <p>Successful brief preparation requires specialist expertise and experience, including, technical services, budgeting and programming.</p>	<ul style="list-style-type: none"> <li>• Engage specialist external consultants where the client does not have the necessary expertise in-house.</li> <li>• Upskill consultants in principles of brief preparation to assist the client when undertaking pre-design and development of the project brief. This may need to be considered a separate commission with different responsibilities, fees and provided by skilled practitioners in that field.</li> <li>• Encourage participation of the client within an interactive communication process through the appointment of a Client Design Manager / Coordinator.</li> </ul>
<p><b>Link to Professional Indemnity (PI) Insurance</b></p> <p>Encourage PI insurance providers to recognise in making PI insurance available and/or setting a premium that good briefs diminish risk and enhance the cooperative resolution of difficulties, and as a consequence reward those who apply good briefing practices.</p>	<ul style="list-style-type: none"> <li>• Further communication with PI insurance providers to be undertaken to discuss this issue.</li> <li>• Establish industry accepted requirements for a project brief to be prepared prior to project initiation, which may form the basis of an agreement between the professional associations and the Insurance Council or Providers.</li> </ul>



## 5.2 Bidding philosophy and a selection strategy for consulting services

**Root cause: Selection of consultants on a lowest bid basis.**

### Guiding principles

(\*Refer to section 4.4 for the Task Force's vision and objectives for consultant selection)

The purpose of a selection strategy is to identify and engage, on equitable terms, the most appropriate consultant(s) available, consistent with the scale, complexity and urgency of the project under consideration.

Appropriate remuneration is required to allow professionals to provide independent and informed advice with the focus on the extent and quality of service. A low-cost competitive bid may give savings of 2% to 3% on fees, but lead to project cost overruns of 10% to 15% or more, due to lower standards of project documentation.

The Task Force's research shows:

- There needs to be a better understanding by clients of the concept of "value" where a greater investment in the early stages of project development (pre-design briefing, design / documentation) will generally result in a much improved building outcome in terms of both capital cost and facilities management/ lifecycle costs.
- Consultancy commissions should take account of the consultant's capability, resources, reputation, relevant experience and design methodology together with the ability to deliver on functional requirements, time and budget expectations.

It is a basic tenet that efficient and competent application of the principles of competition to the whole of the construction industry requires far more emphasis on the capability and competence of the bidder with less emphasis on lowest price, and that this will result in a more competitive and competent industry with sufficient skills to meet the community's expectations.

This is the basis of Qualification Based Selection (QBS) widely used by value-conscious owners.

Christadoulou et al (Qualifications Based Selection of Professional A/E Services) (2004) demonstrate that:

- The lack of a definitive scope of work at the time of selection reinforces the need to select the best qualified firm to assist in the development of a detailed and accurate scope.

- Architectural and engineering services are highly specialised and do not lend themselves to the lowest-responsible-bidder procedure.
- QBS provides lowest lifecycle costs.

Opponents of QBS object to the process, claiming:

- Since QBS does not by definition consider price as a decider, the owner does not get the best price for the project.
- QBS is based on subjective criteria (qualifications) and not objective criteria (price) and thus it is not accurate.
- QBS limits approval of possible proponents to a select few thus favouring older established firms over new firms. Since the firm's experience and expertise become the most important factors in the selection process, the critics ask how a firm can prove its qualifications without having the experience. How can a firm acquire experience if QBS limits the firm's chances of obtaining contracts?

Christadoulou et al quote a case study by the American Institute of Architects comparing the selection processes for public projects in the states of Maryland and Florida. Florida emphasises technical qualifications followed by negotiation of a "fair and reasonable" fee using the QBS format, whereas in Maryland price was the dominant factor, 83% of projects going to the low bidder.

A comparison of projects in these two states showed that the QBS selection method used in Florida appeared to result in about one-half the cost of selection and design and about one-half the administration cost of projects in Maryland, while delivering projects in about three-quarters of the time.

For complex projects, very large contracts and projects where the documentation is immature, relationship contract formats are favoured where the emphasis is no longer on impractical low fees. Examples are alliances, partnering and various forms of incentive based contracts that involve negotiated fee structures where risks of cost over-runs and under-runs are shared between the parties on an agreed, equitable basis.

Recommended Solutions	Actions
<p><b>Selection criteria</b></p> <p>Promote consultancy selection tools that recognise qualifications of the proponents.</p>	<ul style="list-style-type: none"> <li>• Promote consultant selection criteria that take into account:               <ul style="list-style-type: none"> <li>- current workload</li> <li>- available resources</li> <li>- past commission performance</li> <li>- amount of repeat business</li> <li>- experience on similar projects</li> <li>- ability to meet the design /documentation program</li> <li>- preferred secondary consultants</li> <li>- likely fee position</li> <li>- the ability to work in cooperation with the client, the other consultants and the project team</li> </ul> </li> </ul> <p>("No Dispute", NPWC/NBCC, May 1990)</p>
<p><b>Selection on value for money ("Qualifications Based Selection")</b></p> <p>Each client organisation and each industry body should establish and adopt consultancy selection tools based on value for money, such as "Qualifications Based Selection". This may involve preparing new, or modifying existing guidelines and/or checklists on bidding and selection principles based on value selection; equitable risk allocation; whole of life costs; and establishing and weighting selection criteria.</p> <p><b>Existing practices</b></p> <p>Some other existing practices that go part way towards taking the focus off the low price bid as the sole or main selection criteria include:</p> <ol style="list-style-type: none"> <li>a) the two-envelope system</li> <li>b) discarding the significantly lower – say 10% lower – bid, or focusing on the mean or median priced bid</li> <li>c) negotiating on the basis of repeat business based on previous success</li> </ol>	<ul style="list-style-type: none"> <li>• The industry must demonstrate to clients by means of industry seminars and/or direct contact that insufficient fees and premature commitment of work will increase the probability of inadequate documentation and significant contractual claims, whereas purchasing infrastructure designs on the basis of value, whole of life costs, and equitable risk allocation principles rather than price leads to a lower project implementation cost.</li> <li>• Further, an accurate scope of services is required as part of the bid documents.</li> <li>• Document case studies of projects where appropriate procurement strategies have led to highly satisfactory outcomes.</li> <li>• The QBS approach may in time be introduced into legislation at least for Government procurement, as it has been elsewhere.</li> </ul>
<p><b>Ethical selection</b></p>	<ul style="list-style-type: none"> <li>• Encourage selection assessment practices that are open, ethical and transparent.</li> </ul>

Other Avenues to be explored (Note 1)	Actions
<p><b>The Brooks Act (USA – 1972)</b> <i>(refer also page 21)</i></p> <p>Initiate a discussion with government on The Brooks Act which sets out US Federal Government policy requiring any Federal department, agency, or bureau seeking professional services of an architectural or engineering nature from any firm or individual to "... negotiate contracts for architectural and engineering services on the basis of demonstrated competence and qualification for the type of professional services required and at fair and reasonable prices."</p> <p><b>Note:</b> The Queensland Department of Public Works does not support this recommendation because the Queensland State Purchasing Policy already permits the use of value selection of professional and construction services.</p>	<ul style="list-style-type: none"> <li>• Explore the issues and constraints associated with the introduction of State Government legislation (similar to the Brooks Act – which has been adopted by 40 of the United States) to mandate the use of value selection procedures for professional services for Queensland Departments and Government Owned Corporations (GOC's) as an example to industry, and for the benefit of the taxpaying public.</li> </ul>
<p><b>Fee guidelines</b></p> <p>A solution may be to adopt recommended guidelines on how to calculate fees, formulated in consultation with all relevant stakeholders, and to switch the emphasis in the selection of a professional consultant from price to value, capability and experience. Research shows that competition based on value, capability and experience leads to a more price-competitive total project cost, but the concept of recommended components of a fee will require ratification by the Australian Competition and Consumers Commission (ACCC).</p>	<ul style="list-style-type: none"> <li>• Recommended fee scales and guides such as the RAIA's have generally been observed in the breach. A recent decision by the ACCC requires the RAIA to withdraw its Guide which is both out-of-date and based on a very small sample response to a fee survey some years ago.</li> <li>• The RAIA has decided to view this positively and will produce a guideline on the calculation of fees based on cost and time records and measured overheads. This is part of an education process of members which has as its goal the achievement of incomes and profit levels which ensures practices are sustainable.</li> </ul>
<p><b>An "AAA" type rating scheme</b></p> <p>Note: This proposal was not universally accepted and/or thought practical by the industry personnel who provided feedback on the draft report.</p>	<ul style="list-style-type: none"> <li>• The Queensland Government in a recent review of its State Purchasing Policy incorporated a review system which evaluates the performance of consultants and allows the possibility of rewarding good service by increasing the number or frequency of opportunities for work for those whose performance is rated at a higher level.</li> </ul>

**Note 1:**

**Existing legislation relevant to this and other issues**

Legislative and regulatory actions are required to protect the community. The existing Queensland legislation that impacts on the provision of construction documentation and design includes:

- **Professional Engineers Act 2002 (Qld)** – protects the public by ensuring engineering services are provided by registered engineers in a professional and competent way; maintains public confidence in the standard of services provided by them; and upholds the standards of practice of registered professional engineers.
- **Professional Standards Act 2004 (Qld)** – enables the creation of schemes to limit the civil liability of professional operators; helps in improving occupational standards of professionals; and protects consumers of services provided by professionals and others.
- **Building Act 1975 (Qld)** – creates standard laws concerning the erection of buildings and other structures; provides for building certification; and the standard of documentation is under S14B-14D under the Standard Building Regulations.
- **Queensland Building Services Authority Act 1991 (Qld)** – regulates the building industry (1) to ensure the

maintenance of proper industry standards and (2) to achieve a reasonable balance between the interests of builders and consumers. The Act establishes the Queensland Building Services Authority with responsibly to license people who perform building work, provide dispute resolution services, administer a statutory insurance scheme and administer the disciplinary provisions of the Act.

- **Architects Act 2002** – protects the public by ensuring architectural services of an architect are provided in a professional and competent way; maintains public confidence in the standard of service provided by architects; and upholds the standard of practice of architects.

Codes of practice have now been gazetted under the Professional Engineers Act (2002) and Architects Act 2002 being respectively “Code of Practice for registered Professional Engineers of Queensland” in June 2005 and “Board of Architects of Queensland Code of Practice” in November 2004.

Several of the above listed acts, however, could be further strengthened by the addition of a reference to what constitutes adequate project documentation.

However there is some industry criticism of the effect of continual changes in the law on the industry and some stability of legislation is necessary.

## 5.3 Project delivery

Arresting and/or reversing the declining standard of project documentation as a deliverable under professional consultants' commissions will require a strong focus on the following aspects of the project delivery system:

- 1) a renewed commitment by all professional consultants and their clients to – and if necessary mandating under the Professional Engineers Act and the Architects Act – existing industry Codes of Practice, a renewed commitment to restoration of professional ethics as a rightful determinant of professional behaviour, a commitment to raising of professional standards, and a commitment to acceptance by their professions of accountability in everyday operations and in business practices.
- 2) acceptance by both client and consultant of the need to identify risk and opportunity and to allocate them according to the proper principles of risk management.
- 3) restoration or establishment of the role of an overall client-appointed design manager or coordinator on contracts of any significance to monitor the performance throughout the design process.
- 4) renewed appreciation of what is required to optimise designs, and provide documentation of a sufficient quality during the design process.
- 5) addressing by the whole industry including professional organisations, academia and the government, on the current shortage of professional skills and human resources – whilst ensuring adequate standards remain in place.
- 6) addressing current inadequacies and/or ineffective use of modern technologies such as CAD drafting, ability of computer systems to talk to each other along the supply chain, and computer-based communications.
- 7) rationalisation of communication rules and practices.
- 8) developing process control appropriate to project size and complexity.

### Legislative and regulatory support

The existing Queensland legislation that impacts on the provision of project design documentation includes:

- Professional Engineers Act 2002 (Qld)
- Professional Standards Act 2004 (Qld)
- Building Act 1975 (Qld)
- Architects Act (2002)

However, a wider debate among industry participants, together with the government, is required on:

- The effectiveness and implementation of these acts, and
- The potential for an act such as the Brooks Act (1972, USA) or regulations such as through the State Purchasing Policy to encourage emphasis – at least for public/government projects – on Qualifications Based Selection rather than on selection mainly on price.

For example, in 1998 the Queensland chapters of the Master Builders Association, the Australian Institute of Quantity Surveyors, the Royal Australian Institute of Architects, and the Building Industry Specialist Contractors Organisation have agreed that the principal/developer ought to prepare full “Bills of Quantities” for all building projects in excess of \$1 million. Legislation or regulation under the Building Act 1975 or other appropriate act could set this good practice into stone.

### 5.3.1 Professional ethics, standards and accountability

**Root cause: Professional ethics and standards have been devalued, and are not consistently adhered to.**

Renewed focus and understanding of professional ethics and standards are required as part of a new culture for

the industry. Participants need to be more equitable and fair minded in their outlook and be truly accountable for their professional behaviour. The following solutions and actions are suggested for consideration:

Recommended Solutions	Actions
<p><b>Obligations under Codes of Practice</b> Ethics are essentially related to personal professional standards. An appreciation is required of the difference between a code of conduct on one hand, and standards for service provision on the other.</p>	<ul style="list-style-type: none"> <li>• Promote Codes of Practice within industry, within client groups and to the community at large, emphasising minimum standards and encouraging participants to exceed minimum standards.</li> <li>• Promote, both within industry and general community, the importance of adherence to ethical obligations by professionals and steps taken by the industry to ensure such adherence.</li> <li>• Promote cooperative relationships with clients, as opposed to adversarial or legalistic ones.</li> </ul>
<p><b>Disciplining breaches</b></p>	<ul style="list-style-type: none"> <li>• Support the professional associations in applying disciplinary mechanisms for professionals who fail to adhere to their Code of Ethics.</li> </ul>

### 5.3.2 Risk assessment

**Root cause: Poor understanding of risk identification, allocation and management process and lack of risk management knowledge and skills**

Effective risk management is crucial for good project outcomes. It should be standard practice on all projects to formally identify all project risks, to evaluate these risks and to institute appropriate strategies to monitor and manage impacts. A critical part of the management process is the fair and equitable allocation of the risks to contracting parties. The following solutions and actions are suggested for consideration:

The Australian Standard on Risk Management AS/NZS 4360:2004 sets out an excellent outline of the risk management process – a process that ought to be adopted by every member of the building and construction industry.

An outline of this process follows:

- a) communicate and consult with all stakeholders inside and outside the organisation throughout the process
- b) define the project, the time and location and the nature of the decisions that have to be made, identifying any scoping or framing studies needed, and the roles and responsibilities of the participants in the risk management process
- c) establish the external, internal and risk management context and the criteria against which risk will be evaluated. The external context may include, for example:
  - the business, social, regulatory, cultural, competitive, financial and political environment
  - strengths, weaknesses, opportunities and threats
  - perceptions and values of external stakeholders, and
  - key business drivers

Key areas for the internal context include:

- Culture
- Members of the organisation
- The organisation's structure
- Capabilities of the people, systems, processes, and capital, and
- The organisation's goals and strategies

The criteria to evaluate risk may be based on:

- Operational, technical, financial, legal, social, environmental, humanitarian, or other factors

d) identifying the risks including what can happen, where, when, why, and how events could prevent, degrade, delay, or enhance the project objectives, and whether or not these risks are under the organisation's control.

Tools and techniques include:

- checklists, judgments based on experience and records, flowcharts, brainstorming, public consultation, systems analysis, scenario analysis, and systems engineering

e) analyse the risks quantitatively or qualitatively with sensitivity analyses, analyse the existing controls, and the consequences and the likelihood and hence the level of risk

f) evaluate the risks considering the balance between potential benefits and adverse outcomes, including the sources of risk, their positive immediate consequences and the likelihood of them occurring

g) develop and implement specific cost-effective strategies for increasing the benefits and reducing the costs of opportunities and risks by:

- seeking opportunities and avoiding risks
- altering the likelihood of opportunities/risk
- altering the consequences to enhance benefits and reduce costs
- sharing the opportunities/risk, and
- retaining the opportunities/risk

A combination of risk treatment options may be adapted for example, effectiveness of contracts with appropriate insurance and other risk financing.

h) monitor all steps of the risk management process for continuous improvement and to allow for changing circumstances

i) keep records, communicate and consult at every stage, bearing in mind:

- the legal and business needs for records
- the cost of creating maintaining records, and
- the benefits of using information

Risk management planning involves:

1. developing a risk management plan
2. obtaining the support of senior management
3. developing and communicating the risk management policy
4. establishing accountability and authority
5. customising the process the organisation's policies and culture, and
6. ensuring adequate resources

*(Reference: AS/NZS 4360:2004 Risk Management Standards Australia and Standards New Zealand)*

Recommended Solutions	Actions
<p><b>Risk management systems</b></p> <p>Comprehensive risk management packages are required for identification, management and allocation of risk at all stakeholder levels:</p> <ul style="list-style-type: none"> <li>• project owners</li> <li>• consultants</li> <li>• the construction industry</li> <li>• financiers</li> <li>• the insurers</li> </ul> <p>The many risk management packages developed by companies working in the industry provide a valuable resource.</p>	<ul style="list-style-type: none"> <li>• Research and develop risk management frameworks (including risk templates and software useful for all levels of the construction industry – from project inception to completion).</li> <li>• Adopt these frameworks as benchmarks in accordance with the Australian Standard 4360:2004 – Risk Management. (*refer Note 1)</li> <li>• Develop standard documentation formats such as Natspec in conjunction with providers, contractors and the Insurance Council of Australia.</li> </ul>
<p><b>Poor documentation risks</b></p> <p>Poor documentation presents real project risks.</p>	<ul style="list-style-type: none"> <li>• Ensure that risk management plans (including poor documentation risk) are routinely used in the development stages of projects.</li> <li>• Introduce risk awareness/identification by all stakeholders in a project as a basic management process (a simple management matrix).</li> <li>• Have risk management processes taken into account for particular indemnity requirements, professional registration and licensing.</li> <li>• Encourage clients to Implement Independent Risk Auditing of project documentation.</li> </ul>
<p><b>Industry awareness</b></p>	<ul style="list-style-type: none"> <li>• Raise industry awareness of the nature and benefits of effective risk management.</li> </ul>
<p><b>Learning program</b></p>	<ul style="list-style-type: none"> <li>• Integrate risk management as part of all learning institution programs for the building and construction and allied industries.</li> </ul>



### 5.3.3 Lack of integration across the supply chain, and lack of cooperation and communication between the parties

**Root cause: Poor integration along the supply chain, i.e. between project phases**

Successful delivery of complex projects with many stakeholders in an uncertain environment requires the

integration of the planning, design and production processes. This means improved collaboration, communication, and coordination between owners, suppliers, users, and operators. The following solutions and actions are aimed at promoting this:

Recommended Solutions	Actions
<p><b>Integration of activities along the supply chain</b></p> <p>Projects are becoming increasingly complex and effective delivery can only occur when the interfaces between project phases are correctly managed. This involves extensive overlapping in the project phases with joint participation by providers.</p>	<ul style="list-style-type: none"> <li>• Introduce the key elements of effective supply chain management (SCM):               <ul style="list-style-type: none"> <li>- a client project manager – critical</li> <li>- a comprehensive project plan, which may be a separate consultant engagement</li> <li>- an effective project brief finalised in collaboration between client and consultant</li> <li>- support for integration along the supply chain by the timely use of techniques such as value management (as opposed to cost management), value engineering, risk management, etc, ensuring participation jointly of key project stakeholders, i.e. client end-user, designer, sub-consultants, contractors, operator</li> <li>- engagement of the construction contractor early enough to influence the constructability, i.e. at the interface of the design and construction process</li> <li>- a project delivery plan that remains current through the whole of the supply chain management as a living document – make the distinction between documentation for information purposes and for contractual purposes.</li> </ul> </li> </ul>
<p><b>Relationship contracts</b></p> <p>Relationship forms of contract are used for projects which are complex or large. These encourage joint participation.</p>	<ul style="list-style-type: none"> <li>• Promote and/or develop a simple methodology for relationship contracting on projects including those under \$10 million and negotiate with Government for its testing and implementation.</li> </ul>
<p><b>Facility management and lifecycle management</b></p>	<ul style="list-style-type: none"> <li>• Explore the opportunities for a wider engagement of the industry with clients and owners in facility management and life-cycle management.</li> </ul>

### 5.3.4 Design issues: Client’s involvement in coordination of project design; inadequate design process

**Root causes: Lack of a qualified, client-appointed design manager/coordinator to formulate and oversee project integrity and continuity, and**

**Inadequate funding for preparation of briefs, programming and management and accountability at critical stages of design, leading to a poor understanding of what is required to optimise designs and provide quality documentation**

Project clients must accept the benefits of staying involved in the management of the project from start to finish, and monitoring the design process through the appointment of a client design manager/coordinator.

Improvements are also suggested for the design process. It is essential that some checking procedure is adopted for every project. The checking process – in effect a second opinion – has traditionally taken two forms. John Carpenter (The Structural Engineer, 3 August 2004) says:

*“The first is a mathematical review to ensure compliance with the relevant Code of Practice; the second is an overview of the major assumptions, of special features, of reserve redundancy, and the other major influences, to minimise the chance of a significant problem. The first check may be performed at peer level; the second can only be performed by a designer experienced in that field. Prudent organisations implement both checks.”*

Another simple, economical and effective method of checking documentation before it leaves the office is to use a focus group of three or four experienced personnel working together in a three or four hour session around the conference table. The cost of doing this is insignificant compared to the cost of errors in the document.

The following suggested solutions and actions are aimed at addressing these issues:

Recommended Solutions	Actions
<p><b>Client design manager/coordinator</b></p> <p>This role is not about enhanced technical expertise but management and communication skills, and increasing the status and benefits of good design management. It is a specialised role requiring specialised skills as well as knowledge of the process and project requirements.</p>	<ul style="list-style-type: none"> <li>• Promote the benefits of effective design management to achieve coordination across all parties involved in the construction effort. The role is to maintain the focus on overall project objectives, to identify and remove barriers and to keep the client’s perspective continually in view.</li> <li>• Promote the allocation of a single point of responsibility to ensure that documentation is properly coordinated.</li> </ul>
<p><b>Industry recognised design and documentation processes</b></p> <p>It is unprofessional and out of keeping with ethical obligations for individual firms not to establish clear and concise design processes; not to allocate sufficient time for regular meetings, reviews and crosschecking of information and outputs; and not to allow sufficient checking of designs where CAD has been used.</p>	<ul style="list-style-type: none"> <li>• Promote among professional bodies across all disciplines                         <ul style="list-style-type: none"> <li>- architecture, engineering, quantity surveying and project management – the need to establish industry recognised design and documentation processes and systems including benchmarking techniques to ensure continuous improvement.</li> </ul> </li> <li>• Promote discussion within industry associations of past achievements and shortcomings, learning from feedback and changing requirements within the construction industry.</li> </ul>

### 5.3.5 Rebuilding our human resources

#### **Root cause: Skill shortages**

The quality of project documentation is being adversely affected by skill shortages in two ways:

1. A general shortage of staff in the industry – a situation which will become worse as the current infrastructure boom extends over the next one or two decades. For example, growth rates in the Australian engineering population will fall to 1.5% a year by the end of the decade, from 4 to 5% a year historically. The number of engineering graduates – about 5000 students per year of whom 1000 are international students who will return home after graduation – will be the same at the end of this decade as it was at the beginning. In Australia in 2004, there were 1825 applicants who met the minimum tertiary entrance requirements and who wanted to but could not get an engineering place at university. In recent years at least four universities have closed engineering courses.
2. A lack of interest in teaching appropriate documentation skills both in on-the-job training and in academic courses.

Short-term solutions need to consider staff who are already trained:

- i) a mooted rise of 20,000 skilled immigrants per year (approval of a skilled migration visa takes 4 to 5 months, and there is an upper age limit of 45 years)
- ii) greater use of four-year long-stay business entry visas (approval period 10 to 30 days)
- iii) a recent relaxation in overseas students studying in Australia permitted to apply directly for skilled migration without having to leave the country
- iv) flexibility in working hours and assignments to facilitate (re-)hiring working mothers and mature age workers (45 to 64 years plus) experienced in documentation
- v) moves to attract back to Australia experienced practitioners currently working overseas, and allowing overseas based guest workers on major projects.

Medium-and long-term solutions need to focus on in-service and academic training courses similar to those summarised recently by the ACEA (Teresa Charles, Chief Executive ACEA, as quoted in the Australian Financial Review, 4 April 2005). Australia ranked 22 out of 30 OECD countries in the percentage of new science, engineering and building profession degrees in the year 2000. To improve this situation the industry should consider the following initiatives:

- i) the Federal Government's skills audit is a step in the right direction but needs to take account of specific design and documentation skills
- ii) there should be priority allocation for Commonwealth supported places across professional design and construction disciplines and support for specialist postgraduate training
- iii) incentives should be given to universities with a good track record in graduating women in engineering building professions (in 1997, 20.5% of all students starting engineering classes were women, compared with only 14.2% in 2004)
- iv) the current mildly negative perception of engineering building professions among parents and students needs to be modified to encourage more students into engineering as a career building and construction careers
- v) more flexible and industry friendly programs should be introduced, e.g. company based training and development, sandwich courses, mature age entry, accelerated learning and bridging programs
- vi) more encouragement needs to be offered to the 135,300 trainee apprentices who cancelled or withdrew in the year to 30 September 2004 (this compares to 135,700 who completed their courses)
- vii) education to reverse parental attitudes discouraging children from entering the trades.

The following solutions and actions are aimed at promoting the points raised above:

Recommended Solutions	Actions
<p><b>Competency standards</b></p> <p>Minimum competency standards, especially for the design professions, are recognised in many client specifications and contracts, and in legislation and the regulations supporting it.</p> <p>Where minimum competency standards are not yet available in areas of design and documentation within building professions, these need to be created.</p>	<ul style="list-style-type: none"> <li>• Encourage the individual professional bodies to review the situation across the industry as to whether significantly increasing the minimum competency standards is required for professional licences, and whether to impose more substantial requirements for Continuing Professional Development (CPD) for continuing registration.</li> <li>• Encourage individual professional bodies to develop competency standards for their profession, by a date to be agreed, and to register their standard with the appropriate body. (Several industry bodies already have competency standards.)</li> </ul>
<p><b>Qualified staff</b></p>	<ul style="list-style-type: none"> <li>• Promote to client bodies the necessity for engagement of adequately qualified professionals and technical staff and the need to regularly assess performance.</li> </ul>
<p><b>Shortage of skilled personnel</b></p>	<ul style="list-style-type: none"> <li>• Address the shortage of skilled personnel throughout the building and construction industry including such initiatives as industry exchange programs for students and graduates between disciplines, industry-based and in-house training schemes, and strengthening the application of mentoring techniques throughout the industry.</li> <li>• Encourage consulting firms to increase the number of cadetships and traineeships.</li> </ul>
<p><b>School programs</b></p>	<ul style="list-style-type: none"> <li>• Support the various initiatives listed in the introduction to this section.</li> <li>• The construction industry as a whole to support this initiative by supporting moves to increase interest among school and college students with such programs as “EngQuest” and “The Science and Engineering Challenge” currently being promoted by Engineers Australia, and the “Futurenet” program promoted by ACEA.</li> </ul>
<p><b>Skill levels</b></p>	<ul style="list-style-type: none"> <li>• Ensure recognition for design organisations with high calibre CPD schemes and performance, e.g. a few firms are currently exploring with education institutions if their in-house programs can be developed to provide credit towards university qualifications such as an MBA or a Master of Engineering.</li> <li>• Ensure university courses cover ethics and professional standards adequately.</li> <li>• Introduce mandatory ethics and professionals standards training (preferably with regular updates) – no registration without completing training.</li> </ul>

Recommended Solutions (cont)	Actions (cont)
<p><b>Skill levels (cont)</b></p>	<ul style="list-style-type: none"> <li>• Encourage in service training by industry associations and mentoring within the industry.</li> <li>• Sponsor formal risk management training to meet the requirements of consultants and the building industry.</li> <li>• Create training programs to encourage a co-operative approach to integrating the project phases and to problem solving.</li> <li>• Ensure training of new staff provides adequate graduate competency in regard to CAD packages and other technology; and produces competent design and documentation professionals capable of correctly using technology, e.g. by encouraging classes in specification writing.</li> <li>• Sponsor formal design management training by industry bodies for consultants and the building industry and up-skilling of design professionals to recognise value added solutions and good documentation.</li> <li>• Ensure industry-wide training includes techniques for effective communication.</li> </ul>

### 5.3.6 Making effective use of technology

**Root cause: Inadequate/ineffective use of CAD (Computer Aided Drafting) and ICT (Information and Communication Technology) for design purposes**

Ultimately designs need to be developed by competent designers using design skills and traditional design processes that:

- Use technology as a design tool and not a design process.
- Are based on appropriate procedure checklists.
- Include comprehensive checking of work.

Documentation also needs to be produced by competent practitioners:

- Who are well trained in the use of current technology.
- Who are provided with all the project information available.
- Who are recognised as an important part of the design team.
- Who use relevant checklists and procedures.
- Whose work is independently checked.

The solutions and actions listed below are aimed at ensuring the above:

Recommended Solutions	Actions
<p><b>Rapidly changing technology</b></p>	<ul style="list-style-type: none"> <li>• Encourage use of compatible software programs that are capable of integrating with each other, and capable of integrating across the different disciplines allowing fast and effective communication.</li> <li>• Introduce crosschecking mechanisms and the teaching of rule of thumb checks to CAD personnel who operate CAD systems on the basis of IT experience rather than experience in the relevant professional discipline.</li> </ul>

Recommended Solutions (cont)	Actions (cont)
<p><b>Enhance software for the best design and documentation practice</b></p>	<ul style="list-style-type: none"> <li>• Guide the development of software to meet best design and documentation practice that, for example:                             <ul style="list-style-type: none"> <li>- uses technology as a design tool not a design process</li> <li>- includes appropriate checklists</li> <li>- includes comprehensive checking of work, and</li> <li>- keeps track of version control including marked up changes from one version to the next</li> <li>- enables early involvement of contractors' and suppliers' expertise</li> <li>- allows integration of data across disciplines</li> <li>- enables electronic modelling to:                                     <ul style="list-style-type: none"> <li>- visualise the project for public consultation</li> <li>- allow a full appreciation by the constructor</li> <li>- check design interfaces in 3-D to avoid clashes</li> <li>- produce a reliable bill of quantities</li> </ul> </li> <li>- validate the design and produce engineering drawings</li> <li>- provide asset management data.</li> <li>- enable CAD integration with specification text preparation</li> </ul> </li> </ul>
<p><b>Project specific specifications</b></p> <p>Project specifications need to be made specific to the project in hand (avoiding the use of "standard" or "off-the-shelf" specifications except possibly in some engineering disciplines).</p> <p>1. Technological assistance presently comes in the form of Master Specifications which can be electronically downloaded to users' computers. A number of these word processing Master Specifications are available e.g. from:</p> <ul style="list-style-type: none"> <li>- Natspec (Construction Information Systems Australia Pty Ltd)(see Note 1 next page)</li> <li>- SpecPack</li> <li>- Aus-Spec</li> </ul> <p>2. A significant technological advancement to word processing based systems are software programs which assemble project specific specifications from databases. These programs are currently in use.</p>	<ul style="list-style-type: none"> <li>• Encourage and assist Master Specification Developers to:                             <ul style="list-style-type: none"> <li>- continue to prepare documents that cover all construction disciplines, address present day materials and all construction techniques</li> <li>- prepare educational material/tools which assist Specifiers in the competent use of the documents</li> <li>- promote the development and use of software programs that have System Authors determining the required text from Specifier's requirements</li> <li>- promote the development and use of CAD / Specification Writing software that enables the integration of drawings and text preparation and subsequent joint access by the Contractor</li> </ul> </li> </ul>

Recommended Solutions (cont)	Actions (cont)
<p><b>Project specific specifications (cont)</b></p> <p>3. The next generation of these programs will prepare project specific specifications without the need for the Specifier to have expert specification writing knowledge. Such a program is currently being developed by Colin Loag of Professional Specifications.</p> <p>4. The aim of future specification writing software should be to enable the specifying of an item to be undertaken while the item is being drawn using CAD. The resultant electronic drawings and specification would be able to be view simultaneously by the Contractor.</p>	<ul style="list-style-type: none"> <li>• Encourage and assist Master Specification Developers to: (cont) <ul style="list-style-type: none"> <li>- promote commonality in the presentation of contractor / suppliers' information and needs in specifications</li> <li>- encourage, through consultancy agreements, the adoption of compatible software for the consultant and all subconsultants</li> <li>- promote the practice of including project-specific specifications on the drawings where appropriate to avoid the omission of some critical information and to ensure both the specifications and the drawings are preserved together in the long run.</li> </ul> </li> </ul>
<p><b>Design background for CAD operators</b></p>	<ul style="list-style-type: none"> <li>• Develop software users who are expert "machine operators" from staff who first have sound design knowledge of the relevant technical discipline.</li> </ul>
<p><b>Information management systems</b></p>	<ul style="list-style-type: none"> <li>• Develop specific business management training and awareness programs for design management, contract management, cost management, time management and information management.</li> </ul>

[Note 1: NATSPEC specifications currently available include:

- site, structural, architectural, interior, landscaping and services, for both simple and complex projects
- mechanical, hydraulic and electrical engineering services, for both large and small projects
- constructing, extending, or renovating single dwellings.]

### 5.3.7 Communicating across the industry

**Root cause: Lack of appreciation of the essential nature of open communication**

Do we need to rationalise the many types of communications used on projects and clarify the legal/contractual certainty of each of them?

- Verbal / phone
- Verbal / face to face
- Letter delivered by post or courier
- Site Instruction, Request for Information, Site Memo
- E-mail / voice
- E-mail / text
- Facsimile
- Web / written
- Web / voice

Within this plethora of communication techniques, it is critical to realise the power and importance of conversations you have or choose not to have. Roger Olds (Engineers Australia, March 2005) identifies five types of conversation:

- i) conversation for completion – to ensure the path is clear to move forward
- ii) conversation for relatedness – to gain alignment and commitment
- iii) conversation for possibility – to explore what may be done
- iv) conversation for opportunity – to explore how things may be done
- v) conversation for action – to define who and when things will be done and realise that one of the most important parts of conversation is listening.

*“...and to realise that one of the most important part of conversation is listening ... Are you really hearing what they are saying or simply having your own background conversation and preparing for what you want to say next.” (Roger Olds, Engineers Australia, March 2005)*

*“Co-locate detailers working for contractors in design offices side-by-side with detailers working for the design firm during the design detailing stage; co-locate engineers and detailers working for design firms on site while construction progresses.” (“Leveraging specialty-contractor knowledge in design-build organisations”, N Gil et al, 2001)*

The proposals below are aimed at restoring recognition that face-to-face communication is essential for sharing of views, debating options, achieving common understanding and assisting with relationship building. They require that the inordinate time/cost pressures commonly experienced are addressed.

Recommended Solutions	Actions
<p>A project communication plan forms part of the project delivery plan and should:</p> <ul style="list-style-type: none"> <li>• Set up protocols and conventions for electronic and interpersonal communications.</li> <li>• Clarify industry/project roles and level of authority and responsibility. A culture of closed communication thwarts early recognition of project issues/problems – these then only surface when a crisis develops.</li> </ul>	<ul style="list-style-type: none"> <li>• Establish a communication plan at the outset of the project, defining the roles and communication flow between all parties, based on open communication and focused on project outcomes.</li> <li>• Explore the premise that “lack of trust” between parties contributes to ineffective communication.</li> </ul>
<p><b>Portal-based communication systems</b></p>	<ul style="list-style-type: none"> <li>• Explore the use of portal-based communication systems to improve communications between contractor, site and consultants.</li> <li>• Write a specification of industry needs for collaboration with CRC and/or software developers.</li> </ul>
<p><b>Pre-start meetings, production meetings and post-completion meetings</b></p> <ul style="list-style-type: none"> <li>• Reinstate pre-start, production and post-completion meetings.</li> </ul> <p>These will increase communication and build cooperative relationships on the job, all the better to tackle any documentation problems as they arise.</p>	<ul style="list-style-type: none"> <li>• Promulgate communication success stories to support awareness and training activities: <ul style="list-style-type: none"> <li>- “production meetings” to be reinstated with a focus on in-house reviews that ensure achievement of project outcomes.</li> <li>- establish opportunities for “sharing experiences” with improved communication strategies and techniques.</li> <li>- modern innovative communication to be utilised in a manner that augments the fundamental interpersonal processes for communication.</li> </ul> </li> <li>• Improve communication in project documents so they are intelligible to all parties, and establish processes that verify the content means the same thing to all parties.</li> </ul>



## 5.4 Implementation strategy

### 5.4.1 Vision for the construction industry

The Task Force's vision for the future is for an efficient, productive, sustainable and profitable construction sector that will attract the highest quality entrants, through significant improvements in the quality of design and project management documentation, as expressed at the beginning of this Section 5.

A more detailed vision for each of the 10 Core Issues identified by the Task Force is recorded in Section 4:

- For project briefs.
- For integration along the supply chain and between project phases.
- For professional ethics and standards.
- For effective bidding and selection strategies.
- For risk management.
- For the client's design management.
- For the design process.
- For human resources.
- For managing technology.
- For open communication.

Fundamental change in each of these areas will deliver tangible benefit to the community, clients and industry stakeholders through more stable, reliable productive, efficient and effective procurement of construction.

Issues for action to make this vision a reality, identified by the industry and described in this report by the Task

Force are:

- Building stakeholder support and participation.
- Changing industry culture and behaviours.
- Creating a continuous improvement cycle.

### 5.4.2 Building stakeholder support and participation

Industry stakeholders consist of consumers and producers of construction, with support services.

Consumers of construction, including building owners, developers, financiers, insurers, property professionals, end users and others, influence and are influenced by the construction sector, but they often do not see themselves as "inside the industry", because construction is not their core business. Their contribution is at the interface with the industry. Their interest is in the delivery of quality, sustainable infrastructure, reliably, effectively and efficiently.

Producers of construction including designers (architects and engineers), managers (project managers, quantity surveyors), contractors (head contractors, subcontractors, trade contractors) and suppliers have a knowledge and understanding of construction processes. Their responsibility is to manage the delivery of construction and the integrity and sustainability of the industry.

Support services include legislators, educators, researchers, suppliers and insurers.

The primary focus of each of the above groups is:

Stakeholder Group	Primary Focus
<b>Consumers of construction</b>	<ul style="list-style-type: none"> <li>• Engaging consultants and contractors</li> <li>• Project briefing</li> <li>• Design management</li> </ul>
<b>Producers of construction</b>	<ul style="list-style-type: none"> <li>• Sustainable revenue streams</li> <li>• Ethics and standards</li> <li>• Training and professional development</li> <li>• Employment</li> <li>• Research and development</li> <li>• Technology uptake and diffusion</li> <li>• Sustainability</li> <li>• Continuous improvement</li> </ul>
<b>Support services</b>	<ul style="list-style-type: none"> <li>• Education and competence</li> <li>• Research and development</li> <li>• Legislation and regulation</li> <li>• Technology development</li> </ul>

### 5.4.3 Managing the task

The task ahead involves confirming existing standards, modifying where necessary, and/or setting new standards, lobbying industry members and government, and monitoring performance. This is likely to be done with a combination of voluntary cooperation and regulation.

Because it is an ongoing task it will require an ongoing organisation. Such an organisation, to be effective, will need the active support of industry leaders and governments. This more formal body may be set up and sponsored by the industry under a Heads of Agreement, or a Memorandum of Understanding.

In the interim, the 18 existing Task Force organisations must commit leadership, resources and sufficient funding to initiate meaningful initiatives.

The immediate role of the organisation is to:

- Establish a detailed Project Plan or Action Agenda, with appropriate strategies.
- Allocate resources to and monitor the progress of the Project Plan or Action Agenda.

The proposed Project Plan / Action Agenda will be set within a four to five year timeframe.

In the longer term, a plan to implement Quality of Documentation nationally must be developed. This is an important step because the waste and other poor consequences of the current situation in Queensland are proportionately more significant nationally. This national plan could include:

- Seeking the cooperation of sister organisations in the other states and parent organisations nationally of the existing stakeholder bodies.
- Collaborating with any parallel efforts in other states.
- Applying for a Federal Department of Industry, Training and Resources Action Agenda for construction documentation.
- Developing or joining a suitable national umbrella body to manage and monitor a national initiative.
- Developing State based bodies, based on a national model, to implement national quality of documentation policy.

### 5.4.4 Communicating and marketing the message

Many in the building and construction industry – whether client/developer/financier, professional consultant or constructor – are not fully aware of:

- The negative impact of current practices and behaviours on the project delivery process.
- The enormous cost penalties on the industry as a whole, on project owners and on the profitability, indeed the viability of most other parties to the project.

- The angst generated by the present emphasis on adversarial fixed price contracts even in circumstances where a relationship contract would be more appropriate.
- The flow-on effects to other root causes of poor project documentation.

It is imperative that both the impact of poor quality documentation on the industry and external stakeholders, and the benefit of initiatives proposed and developed by the Task Force are communicated clearly and regularly to industry and external stakeholders.

It is proposed that the Task Force develops, as a Project Plan priority, a communications and marketing strategy, to include:

- Public relations strategies.
- Industry information strategies.

### 5.4.5 Changing industry culture and behaviours

The Task Force will develop, manage and monitor a detailed Project Plan or Action Agenda to drive cultural change and behaviours, based on Section 5 of this report, Recommendations for Industry Change.

The Task Force will identify and utilise existing legislation and regulatory authorities to reinforce, define and mandate appropriate documentation standards. Existing legislation and regulations are listed in this report in Section 5.2.

Priorities will be allocated on the basis of high impact tasks, being those that:

- Significantly improve the quality of project documentation.
- Reduce waste and inefficiency in the industry.

From Section 4 of this report, the priority areas identified by the Task Force are:

- 4.1 – Project briefs
- 4.4 – Selection strategy and bidding philosophy
- 4.3 – Professional ethics and standards
- 4.5 – Risk management
- 4.6 – Design management
- 4.9 – Technology
- 4.8 – Human resource capacity

Issues requiring open and frank debate include:

- The strength of and compliance with codes of ethics and professional practice.
- Undercutting and price competition.
- Legislative, industry and professional sanctions.
- The effect of low-price focus by consumer and competition authorities.
- Complacency and apathy in the industry.

- Management skills in the industry.
- Project procurement skills in client organisations.

### 5.4.6 Continuous improvement

A continuous improvement cycle will be established by the Task Force or its successors.

The Task Force and its successors will be responsible for:

- Establishing best practice and continuous improvement standards and monitoring processes.
- Maintaining registers of current research into documentation and supply chain processes and practices.
- Maintaining registers of current technologies that support documentation and supply chain processes and practices.
- Maintaining and updating standards and codes of practice in response to feedback cycles.
- Maintaining and monitoring a complaints / compliance register. Liaising with professional bodies in relation to sanctions and corrective action.
- Monitoring accreditation of educational institutions and professional development programs.
- Providing training and professional development in skills shortage areas.

### 5.4.7 Everyone to play a part

In addition to the responsibility held by the Task Force or its successors to take this work forward, the implementation of change will depend on everyone in the industry. Individuals and organisations can take steps immediately to begin the process of change.

We can all change our approach to project design documentation and become involved in the efforts of our industry association to make the industry-wide and larger changes required to make this better, safer, value for money approach the norm in the industry.

# Appendix:

## Support from the building and construction industry

Support for the proposition that the declining standard of project design documentation has led to significant waste in the construction budget has been overwhelming. The industry is keen to see some resolution of the problem.

### Construction Forum – May 2004

One hundred and twenty senior personnel from all sectors and all disciplines of the industry, working in groups of 10 in an interactive forum, gave close to unanimous support for the definition of the problem, the list of critical issues, and the list of root causes contained in this report.

### Consultation with chief executives

Strong personal support was received in face-to-face interviews with the leaders of all of the stakeholder organisations listed on the back cover of the report. The Task Force and its sub groups were drawn from all of these organisations.

Letters of support signed by their state chief executives have been received from the Queensland chapters of:

- The Association of Consulting Engineers
- The Australian Steel Institute
- The Australian Institute of Project Management
- The Australian Institute of Quantity Surveyors
- Civil Contractors Federation
- Queensland Main Roads
- Department of Public Works
- Master Builders Association Queensland
- Queensland Law Society (Construction Council)
- The Royal Australian Institute of Architects

### Construction Forum – June 2005

One hundred and fifty senior practitioners from all sectors and all disciplines of the industry, working in groups of 10 in an interactive forum gave strong support, table by table, for:

- The 10 root causes listed in the “Getting It Right The First Time” draft report.
- A proposition that all sectors of the industry have contributed to the problem, and therefore must contribute to the solutions.
- More time being spent on the design phase, including time to review documents properly.
- The vision statements listed against each just cause
- A statement that project briefs are often inadequate, and require professional input.
- Wide use of qualifications based assessment (QBS) of consultant services, but with consideration for new entrants, and with legislated regulation restricted to government works.
- A proposition that’s unethical/unprofessional to tender prices that do not cover the services in full unless the ‘reduced services for reduced fees’ are clearly stated.
- The proposals to address skill shortages, but with a balance between professional, technical and trade skills.
- The creation within the industry of an environment that fosters a passion for excellence – rather than an overly prescriptive externally driven code of practice and/or Australian standard.
- A whole of industry Task Force to promote implementation of the report’s recommendations.
- Effort will be required to overcome the \* to changing industry culture such as industry inertia, awareness at all levels, a historic push for lowest price, the will to persist, and the aggressive nature of the industry.

### Individual feedback forms

Individual feedback forms were distributed with the draft report of “Getting It Right The First Time” and 31 were returned separately to the feedback at the June 2005 forum. The results, shown on the next page, revealed strong support for the position taken by the draft report. In response to the feedback, the Task Force made a number of refinements to the report.

# Feedback Results

strongly agree

strongly disagree



- 1** Do you agree that quality of documentation is a major problem for the construction industry today?



- 2** Do you accept industry research on the scale of the problem indicating a 10-15% waste of construction resources, equivalent to an annual loss for Queensland of around \$2 billion?



- 3** Do you think the 10 "Root Causes" identified in this report are the critical drivers behind the problem?



- 4** Do you believe that the problem impacts equally on all segments of the industry – financiers, owners, designers, constructors, suppliers and users – and that all sectors should cooperate in solving the problem?



- 5** Has the report adequately defined a vision for the future that will result in industry benchmarks for project documentation?



- 6** Do you fully support an industry-wide effort to improve the standard of project documentation?



- 7** Do you agree that project briefs are often insufficient to clearly state client requirements?



- 8** Do you support the use of Qualification Based Selection (QBS) of professional services in lieu of the lowest bid?



strongly agree

strongly disagree



**9** Should we as industry (consultants, designers, advisers, contractors, and suppliers) be advising clients/owners that we are not prepared to work for them unless they can demonstrate commitment to allocating enough time, resources and funds to ensuring a suitable level and competency of documentation is available at time of committing to the construction contract and its price



**10** Do you support improvement in the following aspects of project delivery:

**a)** strengthening and/or stronger adherence to existing professional codes of ethics?



**b)** more effective and equitable risk management?



**c)** universal use of a client-appointed design manager?



**d)** the proposals to address the current / looming skills shortages in the industry?



**e)** improving communication across the industry?



**11** Would you support setting up a more formal whole-of-industry task force to promote implementation of the Report's recommendations?



**12** If yes, for how many years?

*Answers ranged up to 10 years with an average of 4 years*

**13** Would you support preparation of an Australian Standard for project documentation?



**strongly agree**

**strongly disagree**



**14** Would you support lobbying for legislative action to mandate QBS for public works in Queensland along the lines of the US Brooks Act (1972)?



**15** Are you in favour of:

**a)** negotiating with the Insurance Council of Australia to reward the highest quality of documentation by a firm with easier availability of / lower premiums for PI cover?



**b)** voluntary participation in an independently run “AAA” type rating scheme for professional consultants?



**c)** recommended fee guidelines for professional services?



**d)** alternatively, strong guidelines for the content / extent / quality of documentation acceptable to industry?



**16** Do you believe the report has identified a credible process for implementation of its recommendations?



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Civil Contractors Federation  
Master Builders Association Queensland  
Property Council of Australia  
Australian Institute of Building

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Air Conditioning and Mechanical Contractors Association  
Institute of Public Works Engineers Australia  
Association of Consulting Engineers Australia  
Royal Australian Institute of Architects  
Australian Institute of Quantity Surveyors  
Building Designers Association  
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